AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Vol. XL
Number 11

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NEW YORK, MARCH 13, 1919

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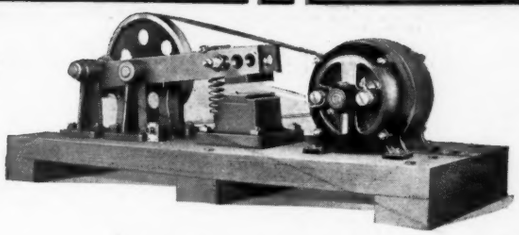
CHAMPION
TRADE MARK

Champion Dependable Spark Plugs



Champion Regular
⅞-18
Price $1.00

Withstand Shocks of 300 Sledge Hammer Blows Per Minute

THE "shock test," which the Champion Spark Plug must survive without injury, is the equivalent to a weight of 3½ pounds, dropping with the rapidity of 300 times per minute.

The qualities that enable Champion Spark Plugs to successfully withstand such severe trials are largely a result of ten year's study and experimenting that developed our patented gasket construction and our Number 3450 Insulator.

Dealers know this No. 3450 Insulator is one of the several reasons why Champion Spark Plugs are more durable and dependable than ordinary spark plugs and why they sell better.

Champion Spark Plug Company, Toledo, Ohio
Champion Spark Plug Co., of Canada, Limited, Windsor, Ontario

Entered as second-class matter Jan. 3, 1906, at the post-office at New York, N. Y., under the Act of March 3, 1879.

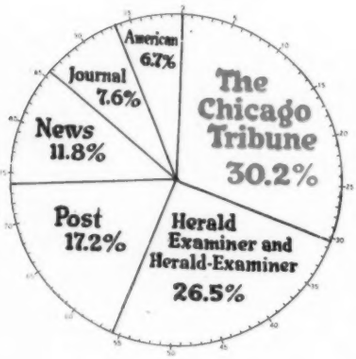
CHICAGO TRIBUNE PRINTS MORE AUTO ADS IN ONE DAY THAN OTHER PAPERS IN SEVEN

During the last six months of 1918 The Tribune printed in its Sunday issue alone more display automobile advertising than any other Chicago paper printed in all its issues. The figures are as follows:

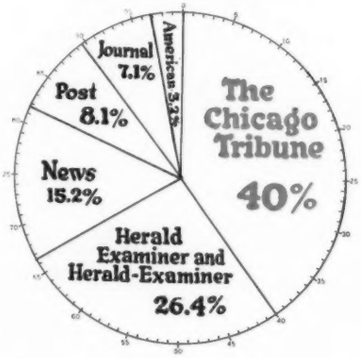
Chicago Sunday Tribune	*168,445*	*Agate Lines*
Chicago Daily Tribune	*67,689*	" "
Chicago Tribune total	*236,134*	" "
Herald-Examiner total	*116,201*	" "
News "	*106,554*	" "
Post "	*101,832*	" "
Journal "	*38,112*	" "
American "	*28,903*	" "

The three charts below picture the proportion of total advertising in the three subdivisions of automobile advertising printed by each Chicago newspaper during 1918:

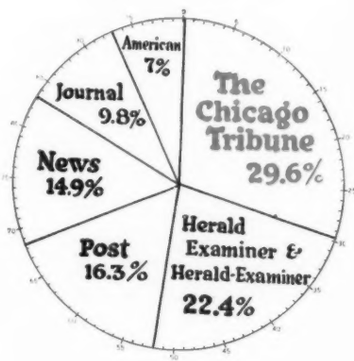
Passenger Cars



Trucks and Tractors



Accessories



The pre-eminence of The Chicago Tribune as an advertising medium has been formally sworn to by witnesses in the million dollar libel suit of Henry Ford against The Chicago Tribune. Charles A. Brownell, advertising manager of the Ford Motor Company, testified under oath that The Chicago Tribune is "by far the best" automobile advertising medium in its territory, and E. LeRoy Pelletier swore that it was one of the few newspapers so powerful and important as to be considered a "national medium."

The Chicago Tribune

THE WORLD'S GREATEST NEWSPAPER

Largest circulation of any Chicago newspaper, Daily or Sunday. In excess of 400,000 Daily and 700,000 Sunday.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XL NEW YORK—THURSDAY, MARCH 13, 1919—CHICAGO NO. 11

Inadequate Cost-Keeping Retarding Adjustment

Government Machinery Oiled to Handle Claims Rapidly but They Are Slow in Arriving

By J. Edward Schipper

DETROIT, March 11—Delays in adjusting government contracts are due to bad cost-keeping systems on the part of the contractor or sub-contractor in practically every instance.

Government machinery for adjusting claims is now so lined up that there is no delay in any department, once the claims have been properly filed and audited. Where the delay is found is in the inability of the contractor to fix the sum for which he should be reimbursed by the Government.

Cost-keeping systems have been so bad in a large percentage of the work done by contractors and sub-contractors that it is now necessary for the Government to employ engineers to make a survey of the work done and of the equipment, etc., in order to reach any basis for a settlement. This naturally has caused considerable delay which would have been eliminated immediately if the contractor or sub-contractor had maintained a good and complete cost-keeping system.

Detroit Claims $1,500,000,000

The total amount of money which will be paid over by the Government in re-adjustments in the Detroit district, when these are finally concluded, will be $1,500,000,000. About 30 per cent of this has already been adjusted. It is estimated that the bulk of the Ordnance and Quartermaster Department adjustments will have been made by April 1. The Bureau of Aircraft Production officials do not believe that their adjustments will be completed before July 1.

This is due to the fact that there are a great many more small concerns which have acted as sub-contractors for airplanes parts; due to the unusual nature of the business and the fact that there are so many small concerns, the cost-keeping methods have been entirely inadequate, which is resulting in a tremendous amount of work being necessary for concerns to get an accurate knowledge of just what the Government owes them.

Peculiar State of Affairs

A peculiar state of affairs exists in many instances. The concerns will tell others how the Government is holding them up on adjustments and at the same time Government officials will be pleading with the concerns to submit statements. This exists in a score or more of factories, usually in the automobile, truck and parts-making businesses, and it is a hard condition to understand. The whole matter, in fact, presents such a complex problem that in its entirety it is, at first glance, bewildering.

Just one phase of the work might be considered as a good example. It would seem that all the Government had to do, on the surface, would be to determine how much was coming to a concern and then pay the bill, but this does not take into consideration the fact that in settling, the Government is obliged to take over an immense amount of ma-

terial which it does not need under present conditions.

This material is all valuable and nearly all salable, but Government officials know that to dump this material on the market at bargain prices would upset industry to such an extent that it would be disastrous in many cases.

Therefore, to handle the matter properly the Bureau of Aircraft Production has a separate department for material disposition, and this department will not dispose of lumps of material of any nature until it has first gone into the market condition and determined whether or not the disposition or sale of that material would have a bad effect on business conditions in that particular line of goods. That is only one of the angles which is constantly arising.

Real Need For Cost-Keeping

One of the lessons of this war which business cannot fail to take to heart is the necessity for accurate cost-keeping. One of the financial papers recently pointed out that during 1918 alone, 9982 concerns failed in the United States of 35,000 new corporations during the same period. In 1917 there were 13,855 failures of 50,000 new corporations. It is stated by the Federal Trade Commission that the main cause of these failures is the lack of knowledge of the cost of production. This has been shown up so clearly in the work of the Ordnance, Quartermaster, and Bureau of Aircraft Production adjustment boards that it must be taken to heart by any of the business concerns which have had dealings with the Government during this war.

With all the complications in view, the progress being made in settling claims is remarkable. The various district headquarters of the army staff organizations have turned their entire forces over to adjustment. The production departments have now become the adjustment departments and the production inspectors who were in the plants, inspecting the manufactured articles, have been switched over to the adjustment department and are now assisting the manufacturers in making up their claims to be presented for settlement.

The contractor who is drawing up the claim and the Government officer who was previously an inspector, probably in his plant but who is now working in the adjustment department as a representative of the Government, go over the raw material, the materials in process, the special machinery, the new plant area, the labor cost, and all of the factors which enter into the settlement of a claim.

As each amount is itemized it is O. K.'d by the Government man and finally the claim is completed, whereupon it is submitted to the claim board with a recommendation from the Government or staff man as to its acceptance or modification. He will recommend its acceptance if he and the manufacturer are in agreement on all points. If they are not fully in agreement he will indicate the points at which he differs from the manufacturer.

Method of Making Claims

This claim and the recommendation of the staff man is brought to the claim board. An auditor is then sent out to the plant to go over the claim as submitted and to check up the items. When he has approved it, the claim comes before the claim board which sits in the district office, and when this board has passed the claim the contracting officer makes up a cancelling contract. This contract states that in consideration of the cancellation of the previous contract, the Government will reimburse the contractor for the sum required.

The cancelling contract is then turned over to a reviewing attorney, who goes over it and passes upon it, and it is submitted for the signature of the contractor. After he signs it the contractor is ready for payment, and this is made very quickly. From the time a claim is filed up to the time payment is received is generally about 10 days or 2 weeks, unless some complications have entered into the matter.

The Quartermaster Department, according to the district officer, expects to be all cleaned up on its adjustments by April 1, as is also the case with the Ordnance Department. The business of the Quartermaster Department in this territory, while large in money, does not cover, by any means, the same number of concerns as the Ordnance or Bureau of Aircraft Production. The Quartermaster Department has allowed about 150 claims, running from $4,000 to $500,000. It has but twelve claims still to audit. The Quartermaster Department has a force of 150 inspectors who are now on the advertising staff, and they are rapidly cleaning up the work as indicated.

Concerns which did extensive Government work, such as Anderson Electric, Peru Axle Co., J. C. Wilson, Federal and Denby, have all been adjusted. The adjustments of these five concerns alone totals $358,000, the smallest being $4,000 and the largest, $250,000. On the other hand, important accounts such as Packard, which has a great many sub-contractors, Continental, McCord, Republic, Service and Signal, are not as yet adjusted.

Some Complaints Not Justified

A strange condition exists in that some concerns, while stating that they are not in a hurry to file their claim and will require from 3 to 4 weeks additional time to do so, have stated to outside parties that the Government is slow in making adjustments. This is a situation difficult to understand but which certainly is found to exist.

One of the most difficult problems in the matter of adjustment is to allow the proper amount for new plants. The system used by the Quartermaster Department, in which it was necessary particularly for a large amount of plant area to be constructed, is to figure the cost of the new plant on a pre-war basis and sell it to the contractor on that arrangement. This has resulted in contracting concerns securing the plants for about 65 per cent of what they actually cost on a war-time figure. The Government arranges this by paying the concern 35 per cent of the cost of the plant, and since the concern has bought the plant at 100 per cent, this leaves 65 per cent as an average figure on plant cost adjustment.

Government Spirit Commendable

Another matter on which the two come in agreement in the cases of all departments is on scrap value. Where materials are obviously of no use to the Government, the plant is asked to bid on the material on the basis of the scrap value, and the material is frequently sold to them on that basis.

Throughout, the proceedings are being conducted by the Government departments in a spirit which is highly commendable. The machinery is all set to act rapidly upon all claims presented, the adjustments are being made on the most broad-minded scale, not only taking fully into consideration all losses due to cancellation of contracts but honoring all implied future business which was not in actual contract form—that

SUMMARY OF CLAIM

BASED ON B. A. P. CONTRACT FORM 60

Sheet No.	CLASSIFICATION OF CLAIM			Amount Due Contractor
	(a) Finished products on hand at contract price	$.....		
	Less freight charges, if contract or order specifies delivery at point other than factory	.....	$.....	
	(b) Cost of raw material on hand applying on this contract, and including handling charges and proper portion of overhead	.....		
	10% profit on raw materials on hand	.....	.....	
	Cost of partly finished product on hand, including material, labor and overhead costs	.....		
	10% profit on partly finished product on hand	.....	.....	
	Overhead expenses directly chargeable to uncompleted portion of contract	.....		
	10% profit on overhead expenses	.....	.....	
	(c) Commitments to suppliers and subcontractors chargeable directly to cancellation of contract			.....
	(d) Cost of special facilities (buildings, equipment, special tools, etc.) chargeable to cancellation of contract	.....		
	Less fair value of special facilities at termination of contract	.....		
	Loss in value of special facilities	.....		
	Pct. of total contract uncompleted.	.....		
	Loss in value of special facilities chargeable to cancellation of contract	.....		.....
	Total claim			$.....
	(e) Less sale price of property purchased by contractor			
	Raw material	$.....		
	Partly finished products	.....		$.....
	Finished products	.....		$.....
	Balance due contractor	.....		$.....

is where a concern went ahead and constructed a plant to take care of a greater volume of business than the original contract called for, because it had received a letter from the Government stating that it may expect to do a business along bigger lines than the original contract, this has been fully considered in making adjustments.

On the other hand, manufacturers have asked for very heavy considerations for which the Government has not felt itself liable. In some cases concerns have charged in the time of salesmen due to their non-employment on company business while the concern was on war work. That is, where the companies have kept these salesmen on their payrolls while they were inactive as salesmen, they have in some cases attempted to charge the salaries of these men to the Government. This has not been allowed. Neither has advertising been allowed.

Makes Them All Cost-Plus Contracts

One of the virtual results of adjustment has been to make practically every completed contract a cost-plus contract. The adjustments are calculated on the basis of the expense to which the concern has gone in getting ready for Government manufacture and partially completing the contract, plus a reasonable percentage.

It is in the figuring of these costs that the weakest part of the system is found. Had every contractor and sub-contractor on a Government contract a good up-to-date, accurate cost-keeping system, practically all adjustments would have been made. There is no lack of money to make adjustments, because the original appropriations for manufacture are available for the purpose; there is no lack of speed in the Government machinery for making the adjustment. The delay is solely on the part of the contractor being unable to submit his claim, based on a set of figures which have been accurately compiled from a clear-cut, business-like cost system.

The Government is allowing a profit not in excess of 10 per cent on material, labor and overhead. The figure on overhead varies all the way from 50 per cent up to 800 and 900 per cent, but a fair average is 150 per cent. In reaching their conclusions, the Government departments are going out of their way to recognize fully the industrial assets of the company before the war and at the time the adjustment is made, to see that these concerns which did Government work do not industrially suffer from that fact.

Confidential reports are filed along with the claims which tell the article manufactured before the war, the articles manufactured for the Government in all departments, the articles manufactured for the particular department making the adjustment, the articles to be manufactured after the war, the total number of male employees before the war, total number of female employees before the war, total of male and female employees during the war, and the estimated number to be employed after the war. The percentage of the plant now on commercial production is estimated and also how long it will take to get into full commercial production. A careful note is also made on a form filed by the Bureau of Aircraft Production on the cost system used by the concern filing the claim.

A typical sheet used by the Bureau of Aircraft Production in drawing up the summary of the claim is shown herewith. This gives a clear idea of some of the matters considered in making adjustments.

All Adjustments Soon Made

It will not be long, perhaps the middle of summer at the latest, when all the adjustments have been made, and the money which is tied up at present will have been paid out. It is certainly true that during this interval the industry is going to suffer. The reason is not far to seek. This delay and suffering would never have occurred had cost-keeping been thorough and complete in all instances. It would not be too much to say that the Government should work out a standard cost system to be used in connection with Government contracts hereafter, and to keep this knowledge filed

(*Continued on page* 568)

Equal Representation in Management Offered Harvester Employees

Workers to Elect Representatives to Meet with Equal Number Representing Employers, to Solve All Problems of Labor

[*As* AUTOMOTIVE INDUSTRIES *was going to press a telegraphic dispatch from Chicago stated that the workers in 14 out of 17 American plants and in all three Canadian plants decided by majority vote Wednesday to adopt the Harvester plan. The three plants where approval was not given by the workers were the McCormick Works, the McCormick Twine Mill and the Tractor Works, all on Chicago's West Side.*]

PLAN OF GREAT IMPORTANCE AND SPECIAL SIGNIFICANCE

THE plan of the International Harvester Co., which is given below, is of great importance and of special significance to the manufacturer in the automotive field because the International Harvester Co. is the largest concern having business of a similar character to that of other automotive manufacturers, at least in some departments, and because of the fact that, conditions being similar in many of the shops, the form of organization has a particular significance for other manufacturers in this field.

The form of organization itself is very interesting and is very similar to the forms of organizations adopted by some of the steel companies, oil companies and other manufacturing cooncerns which have been considered in these columns in previous issues.

It will be noted that in some respects it is a much simpler form than the organization adopted by concerns like the Colorado Fuel & Iron Co., and it avoids two of the difficulties with such organization plans.

It does not make any discrimination between the worker who is paid a salary and the worker who is paid by the hour.

It makes the logical and proper distinction between those who have supervision and those who do not.

It also provides for a simpler form of judicial procedure and this is a very great advantage.

The plan is well worked out but space will not permit of a lengthy discussion of it and this will be deferred to a later issue.

We recommend it to the very careful and studious consideration of all manufacturers in this field because of the special bearing which it has to the manufacturing conditions in this field and also because of the clear character and purpose of the organization.

—*Harry Tipper.*

CHICAGO, March 11—The International Harvester Co. has to-day asked its 30,000 employees to vote on whether they want to have equal representation in the consideration of all questions of policy relating to working conditions in the different factories, measures for the improvement of health, steps for educational improvement, and all other factory matters of similar nature where there is a mutual interest between the employees and the employer or the management.

The scheme is an Industrial Council form of organization in which a Works Council is the major body. This Works Council is made up of equal representation from the management of the Harvester company and the factory workers. The factory workers elect by secret ballot what is known as Employee Representatives, in the ratio of one such representative for each 200 to 300 workers.

The management appoints what it calls Employee Representatives which in the Works Council are equal in number to the representatives of the factory employees.

This Works Council shall never have less than five employee representatives and a similar number of management representatives. Both of these groups of representatives shall have equal voice and voting power in all matters brought before the Works Council.

Should the Works Council not be able to reach an agreement on any questions before it then the matter is referred to arbitration. No such question can be referred to arbitration unless by mutual agreement of the factory representatives as well as the management representatives. When it is agreed that a matter has to be arbitrated upon the Works Council proceeds to agree upon an arbitrator. In case they cannot agree upon such an arbitrator then the employee representatives select one and

the president selects another. If these two agree their decision shall be final. If they cannot agree they select a third arbitrator and the decision of the three shall be final.

All employees who are working in any factory shall have the right to vote for the election of employee representatives from that factory. Nominations for employee representatives will be made four days before voting. Employees will vote by ballot. All employees both men and women shall be entitled to vote except foremen, assistant foremen, and other employees having the power to employ or discharge workers.

Whenever employee representatives have to journey to other cities to take part in the Works Council their traveling and maintenance expenses will be cared for by the International Harvester Company.

The underlying principle of the movement is to secure equal representation between the plant management and the plant employees and thereby do away with the arbitrary power of the managment.

Whenever there are matters affecting several factories the president, Harold F. McCormick may summon what is designated as a general council. This would be made up of employee representatives from the different Works Council, there being a Works Council for each factory. There shall be one representative of the workers in the general council for each 1000 of employees or a major fraction thereof and no factory shall have less than two representatives in a general council.

In a general council the management shall appoint a number of representatives equal to that of the employees.

The president or some person designated by him shall act as chairman of the general council but he shall not have voting power.

Organization of International Harvester Industrial Council

Article I. Purpose:

The employees and the management of the International Harvester Co. and its subsidiary companies undertake by the adoption of this plan of an Industrial Council to establish these relations upon a definite and durable basis of mutual understanding and confidence.

To this end the employees and the management shall have equal representation in the consideration of all questions of policy relating to working conditions, health, safety, hours of labor, wages, recreation, education and other similar matters of mutual interest.

Article II. Works Councils:

As the principal means of carrying this plan into effect, there shall be organized, at each Works adopting the plan, a Works Council composed of representatives of the employees and representatives of the management. The employee representatives shall be elected by the employees. The management representatives shall be appointed by the management, and shall not exceed the employee representatives in number. Both shall at all times have an equal voice and voting power in considering matters coming before the council.

Through these councils any employee or group of employees, or the management, may at any time present suggestions, requests or complaints, with the certainty of a full and fair hearing. Matters which cannot be thus disposed of may, by mutual consent, be submitted to impartial arbitration as hereinafter provided.

Article III. Department of Industrial Relations:

To aid in carrying out this plan the company has established a Department of Industrial Relations which is charged with the duty of giving special attention to all matters pertaining to labor policies and the well-being of the employees.

Article IV. Voting Divisions:

The basis of representation shall generally be one employee representative for each two hundred to three hundred employees, but in no case shall there be less than five employee representatives in the Works Council.

In order that the different departments and crafts may be fairly represented, each works shall be divided into Voting Divisions, and each division shall be assigned its proper number of representatives, based upon the average number of persons employed therein during the month of December preceding the election.

The Works Council may change the Voting Divisions whenever necessary to secure complete and fair representation.

Article V. Qualifications of Employee Representatives:

1. To be eligible for nomination as employee representative from any Voting Division the employee must be employed therein.
2. Foremen, assistant foremen, and other employees having the power of employment or discharge, shall not be eligible for nomination.
3. Only employees who are citizens of the United States, twenty-one years old or over, and have been continuously in the works' service for one year immediately prior to nomination, as shown on the records of the employment department, shall be eligible for nomination as employee representatives.

Article VI. Nomination and Election of Employee Representatives:

1. Nomination and election of employee representatives shall be by secret ballot. The first nomination and election shall be held as soon as practicable after the adoption of this plan, at which time the full number of employee representatives shall be elected.
2. At the first meeting of the Works Council the employee representatives shall be divided by lot into two classes, one-half with terms expiring on Jan. 1, 1920, and the other half with terms expiring on July 1, 1920. Thereafter the election of employee representatives of the first class shall be held in December and of the second class in June. Except as above provided, all employee representatives shall hold office for one year and until their successors are duly elected.
3. Notice of the time appointed for nominations and elections shall be given by bulletins posted publicly in the works at least two days before the date set for the nominating ballot.
4. All employees, both men and women, shall be entitled to vote, except foremen, assistant foremen, and other employees having the power of employment or discharge.

Nominations

5. Nominations shall be made in the following manner: Not more than four days before the date fixed for the election, a nominating vote shall be taken. A blank ballot stating

the number of representatives to be nominated from his Voting Division will be offered to each employee present at work on the date of the nomination, including all workers on the night turn, if any.

6. On this ballot the employee will write (or he may have a fellow employee write for him) the name of the person he desires to nominate. If his Voting Division is to elect one representative then one name shall be written on the ballot; if his Voting Division is to elect two representatives then two names, and so on.

7. Any ballot containing more names than the number of representatives to be elected from that Voting Division shall not be counted.

8. Employees will deposit their ballots in a locked box carried by a teller representing the employees, who shall be accompanied by a timekeeper.

9. When all who desire have voted, the timekeeper and two employee watchers shall open the ballot box and count and record the votes, in the presence of the works auditor, or person designated by him.

10. In Voting Divisions from which *one* representative is to be elected, the *two* persons receiving the highest number of votes shall be declared nominated. If any Voting Division is to elect *two* representatives, then the *four* persons receiving the highest number of votes shall be declared nominated, and so on.

11. If any person nominated is disqualified under the provisions of Article V, then the properly qualified candidate receiving the next highest number of votes shall be declared the nominee.

12. The results of the balloting and the names of the nominees shall be posted in the works as soon as the votes have been counted and the nominations declared.

Elections

13. Not more than four days after the nominations are posted, the election by secret ballot shall be held in the same manner as for nomination, except that at the *election* only the names of the persons who have been duly nominated shall appear on the ballots, and these persons alone can be voted for.

14. The name of the nominee receiving the highest number of votes shall be placed first upon the election ballot; the name of the nominee receiving the next highest number shall be placed next on the election ballot, and so on.

15. At the election the candidate or candidates receiving the highest number of votes in his or their Voting Division shall be declared elected members of the Works Council.

Article VII. Appointment of Management Representatives:

Upon the election of the employee representatives the management will announce the appointment of the management representatives in the Works Council, whose number shall in no case exceed the number of elected employee representatives.

Article VIII. Vacancies in the Works Council:

1. If any employee representative leaves the service of the works, or becomes ineligible for any of the reasons stated in Section V, or is recalled, as provided in Section IX, or is absent from more than four consecutive meetings of the Works Council without such absence being excused by the Council, his membership therein shall immediately cease.

2. All vacancies among the employee representatives shall be promptly filled by special nomination and election, conducted under the direction of the Works Council in the same manner as regular nominations and elections. Vacancies among the management representatives shall be filled by appointment by the management.

Article IX. Recall of Employee Representatives:

1. If the services of any employee representative become unsatisfactory to the employees of the Voting Division from which he was elected, they may recall him in the manner herein provided.

2. Whenever a petition is filed with the Chairman of the Works Council, signed by not less than one-third of the employees of a Voting Division, asking for the recall of their representative, a special election by secret ballot shall be held in that Voting Division under the direction of the Works Council, to decide whether such representative shall be recalled or continued in office.

3. If at such election a majority of the employees in the Voting Division vote in favor of recalling their representative, then his term of office shall immediately cease; otherwise he shall continue in office.

4. Any vacancy so created shall be immediately filled by a special election, as provided in Section VIII.

Article X. Organization and Meetings of the Works Council:

1. The manager of the Department of Industrial Relations or someone designated by him, shall act as chairman of the Works Council. A secretary shall be appointed by the superintendent of the Works. Neither the chairman nor secretary shall have a vote.

2. A majority of the employee representatives, together with a majority of the management representatives, shall constitute a quorum, and no business shall be transacted at any meeting where less than a quorum is present.

3. The Works Council may appoint such sub-committees as it deems desirable for efficient conduct of its business. On all such sub-committees both the employees and the management shall be represented, and each group of representatives shall have equal voting power.

4. The Works Council shall hold regular monthly meetings at times fixed by the Council. Special meetings may be called on three days' written notice by the chairman, secretary, or any three members of the Council. Sub-committees shall meet whenever necessary.

5. The company shall provide at its expense suitable places for meetings of the Works Council and its sub-committees and the employee representatives thereon.

6. Employees serving as members of the Works Council shall receive their regular pay from the company during such absence from work as this service actually requires, except that if the employee representatives so desire, they shall be at liberty to arrange for compensation to be paid by pro rata assessment among the employees.

7. Employees attending any meeting at the request of the Works Council or any sub-committee shall receive their regular pay from the company for such time as they are actually and necessarily absent from work on this account.

8. The Works Council may prepare and distribute to the employees reports of its proceedings, and the expense thereof shall be borne by the company.

Article XI. Duties and Powers of the Works Council:

1. The Works Council may consider and make recommendations on all questions relating to working conditions, protection of health, safety, wages, hours of labor, recreation, education and other similar matters of mutual interest to the employees and the management. It shall afford full opportunity for the presentation and discussion of these matters.

2. The Works Council may on its own motion investigate matters of mutual interest and make recommendations thereon to the Works Management; and the management also may refer matters to the Works Council for investigation and report.

3. The Works Council may confer with the superintendent or other person designated by him in regard to all matters of mutual interest, and shall receive from the management regular reports in regard to accident prevention, sanitation, restaurants, medical service, employment, educational programs and recreational activities, including information as to the cost, efficiency and results obtained.

4. The Works Council shall be concerned solely with shaping the policies of the company relating to the matters heretofore mentioned. When the policy of the company as to any of these matters has been settled, its execution shall remain with the management, but the manner of that execution may

at any time be a subject for the consideration of the Works Council.

Article XII. Procedure of Works Councils:

1. Employees desiring to bring any matters before the Works Council may present these to the secretary of the council either in person or through their representatives. It shall be the secretary's duty first to ascertain whether the matter has been properly presented through the regular channels to the superintendent, and if not he shall see that this is promptly done.

2. If the matter is not satisfactorily disposed of in this manner, the secretary shall submit a written statement of the matter to each member of the Works Council at least three days before the next regular meeting.

3. Any employee or group of employees thus referring a matter to the Works Council shall have an opportunity to appear before it and present the case. Any such group of employees shall select not more than three spokesmen from their own number to appear before the council.

4. The Works Council may call any employee before it to give information regarding any matter under consideration. The Works Council, or any sub-committees appointed by it for that purpose, may go in a body to any part of the plant to make investigations.

5. After complete investigation and full discussion of any matter under consideration by the Works Council, the chairman shall call for a vote, which shall be secret, unless otherwise ordered by the Council. The employee representatives and the management representatives shall vote separately. The vote of a majority of the employee representatives shall be taken as the vote of all and recorded as their unit vote. Similarly, the vote of a majority of the management representatives shall be taken as the vote of all and recorded as their unit vote.

6. Both the employee representatives and the management representatives shall have the right to withdraw temporarily from any meeting of the Works Council for private discussion of any matter under consideration.

7. When the Works Council reaches an agreement on any matter, its recommendation shall be referred to the Superintendent for execution, except that if the Superintendent considers it of such importance as to require the attention of the general officers, he shall immediately refer it to the President of the International Harvester Company, who may either approve the recommendation of the Works Council and order its immediate execution by the Superintendent, or proceed with further consideration of the matter in accordance with Article XIII.

8. In case of a tie vote in the Works Council, it shall be in order to reopen the discussion, to offer a substitute or compromise recommendation, on which the votes shall be taken in the same manner as above provided.

Article XIII. Reference to the President:

1. If after further consideration, the vote in the Works Council remains a tie, then the matter shall, at the request of either the employee representatives or the management representatives, be referred to the President of the International Harvester Company.

2. The President, or his specially appointed representative, may confer with the Works Council as a whole, or any subcommittee thereof, or any group of employee representatives, at such time and place and in such manner as in his opinion will best serve to bring out all the facts of the case.

3. Within ten days after the matter has been referred to him, the President shall either

(a) Propose a settlement thereof; or

(b) Refer the matter directly to a General Council to be formed as provided in Article XIV.

4. If the settlement proposed by the President is not satisfactory to a majority of the employee representatives, and if after a further period of five days no agreement has been reached, then the President may, if he deems it advisable, refer the matter to a General Council to be formed as provided in Article XIV.

5. If the President decides not to refer the matter to a General Council, or if the vote of the General Council is a tie, then the matter may, by mutual agreement of the President and a majority of the employee representatives, be submitted to arbitration, as provided in Article XV.

Article XIV. General Council:

1. Whenever in the opinion of the President any matter coming before any Works Council affects other Works of the company, or whenever he desires to refer any matter as provided in Article XIII, he may call a General Council to consider such matter, and thereafter the Works Council shall take no further action thereon.

2. The General Council shall be formed in the following manner: The President shall issue a notice designating the several Works which he deems jointly interested. Thereupon the employee representatives in the Works Council at each of the Works designated shall select two or more of their own number to act as members of the General Council. There shall be one such member of the General Council for each 1000 employees or major fraction thereof, except that no works shall have less than two representatives in the General Council.

3. The management representatives in the General Council shall be appointed by the President and shall not exceed the number of employee representatives.

4. The President or some person designated by him shall act as chairman of the General Council, without vote.

5. The first meeting of the General Council shall be held within ten days after the President's notice calling such Council.

6. The General Council shall, when necessary, take recesses in order to allow employee representatives therein to confer with other members of their Works Councils. For this purpose special meetings of the Works Councils as a whole, or of the employee representatives alone, shall (at the request of the employee representatives serving on the General Council) be convened at the respective Works, and full opportunity shall be given for conference and discussion with such representatives regarding their attitude and action on the pending matter.

7. Reasonable traveling expenses, including hotel bills of employee and management representatives serving on a General Council, shall be paid by the company.

8. The procedure in the General Council with reference to the consideration of matters coming before it and the manner of voting shall be the same as that prescribed for the Works Council.

9. If the General Council is unable to reach an agreement as to any matter, it may, by mutual agreement of a majority of both the employee representatives and the management representatives, be submitted to arbitration.

Article XV. Arbitration:

1. Whenever the President and a majority of the employee representatives in the General Council, or the Works Council, as the case may be, have mutually agreed to submit a matter to arbitration, they shall proceed to select an impartial and disinterested arbitrator. If they cannot agree upon an arbitrator, then the employee representatives shall choose one such arbitrator and the President shall choose another, and if these two agree their decision shall be final. If they do not agree, then they shall select and call in a third arbitrator, and a decision of a majority of these three shall be final.

2. The arbitrator or arbitrators shall be furnished all the information and testimony they deem necessary regarding the matter in arbitration.

Article XVI. Decisions of General Council or by Arbitration:

All decisions of any General Council or of any arbitrator or arbitrators shall be binding upon all the Works originally designated by the President as being jointly interested. Any such decision may be made retroactive.

Article XVII. Guaranty of Independence of Action:

Every representative serving on any Works or General Council shall be wholly free in the performance of his duties as such, and shall not be discriminated against on account of any action taken by him in good faith in his representative

capacity. To guarantee to each representative his independence, he shall have the right to appeal directly to the President for relief from any alleged discrimination against him, and if the decision of the President is not satisfactory to him, then to have the question settled by an arbitrator selected by mutual agreement.

Article XVIII. No Discrimination:

There shall be no discrimination under this plan against any employee, because of race, sex, political or religious affiliation or membership in any labor or other organization.

Article XIX. Decisions Affecting Wages:

Decisions affecting wages made by any Works Council or General Council or by arbitration shall be subject to revision whenever changed conditions justify, but not oftener than at intervals of six months.

Article XX. Amendment or Termination of Plan:

1. This plan may be amended by the Works Council of any Works by a majority vote of all the duly elected employee representatives together with a majority vote of all the management representatives. Amendments must be proposed in writing at a regular meeting, and no vote shall be taken thereon until the regular meeting following such presentation. No amendment shall be adopted that will destroy or limit the equal voting power of the employee representatives and management representatives in the Works Council and General Council.

2. If in the judgment of the President any proposed amendment affects other Works, then he shall call a General Council to consider such amendment. The adoption or rejection of an amendment shall not be the subject of arbitration.

3. This plan may be terminated, at any Works, after six months' notice, by a majority vote of the employees of that Works, or by action of the Board of Directors of the company.

Adoption of Plan

This plan shall become effective at any Works upon adoption by a majority vote of the employees of such Works voting thereon at a special election held for that purpose.

Inadequate Cost-Keeping Retarding Adjustment

(*Continued from page* 563)

away for future use. What is true in Government work is true to a lesser but not insignificant degree in commercial life. Cost keeping must be put on a higher plane than ever before if general business is to be kept stable.

The situation in other districts exactly parallels that of the Detroit district. There has been held at Washington a meeting of the representatives of the districts Ordnance offices, for the purpose of planning to speed up the settlement of contract claims. It was brought out that less than 25 per cent of the expected number of ordnance claims have been presented to the district claims boards by contractors, to date. The district chiefs advised that the delay results from the magnitude of the work involved in setting up the claims which entail the taking of complete inventories of materials and supplies, determining the liability of the contractors to their sub-contractors and supplies of material.

All district chiefs present were urged by war department officials to use every effort to speed up the work of settling claims of contractors in order to relieve, so far as possible, the unemployment situation, and advised to use all means possible to bring financial relief to sub-contractors where payments are being delayed by the preparation of claims of prime contractors.

The Cleveland district office reported that seventy-two claims have been presented to it up to last week; that awards have already been made or are ready to be made in a majority of these, and that most of the remaining claims are expected to be presented by contractors within the coming two weeks.

Practically the entire staff of the Cleveland Ordnance district is now devoted to checking and expediting settlement of ordnance contractors' claims, and the contractors and sub-contractors are finding it highly advantageous to consult with the district claims board in setting up their claims resulting from cancellation or suspension of contracts.

The Wallis tractor exhibit at the Kansas City tractor show was an excellent example of manufacturers' merchandising. The chassis showed most parts exposed and there was a goodly display of components

Export Managers Enthusiastic

Optimism the Keynote of Well-Attended N.A.C.C. Convention —Plans for Combinations Under Webb Law Outlined —Importance of Proper Packing

THAT the United States has been a slumbering giant in the matter of export trade was the thought which dominated J. Walter Drake's introductory address at the Export Managers' Convention of the N.A.C.C., held last Friday in New York. He said, in effect, that an academic view of our country's present position in relation to the development of overseas business was not an ideal way of looking at things and that our future in foreign trade called for constructive and eminently practical action if we were to hold the markets we have gained and get back those we have lost owing to war conditions.

"Keep our ideals high and our hands clean," said Mr. Drake, who then went on to state that our industry's history during the 4 years of war had indelibly stamped it as the real leader in foreign trade and that it was up to the automotive export men to maintain the highest level of commercial integrity in our relations with our foreign customers in order to consolidate our future on a permanent basis.

He pointed out that history-making events now taking place in Europe would probably lead to new relationships as between ourselves and other countries, to new associations of both economic and social trends and that it was imperative that we realize to the full those differences in manners and customs which constitute (if ignored) the chief difficulty in the conduct of successful business.

Mr. Drake added that we had a vast inland population which did not always realize the magnitude of our overseas possibilities in relation to the expansion of our trade and that in his opinion the automotive industry was so organized that in future it would point the way to other branches of the country's commerce in the development of a general foreign trade of practically limitless extent.

Mr. Drake also touched upon the evident reluctance of factory executives to accept statements from their export departments as to differences and refinements demanded by buyers in various foreign countries; that this was a condition which demanded careful attention and prompt remedying; and that although the problem might be easy to the larger manufacturer it was not always such a simple matter for the smaller factory.

He emphasized that the success of our export trade called for co-operation in service to an extent which would enable the smaller maker to enter the field on terms of equality with his bigger competitor, remarking that the factory which exports 5000 cars a year benefits by the competition of the maker who exports 5 in the same period on the broad principle that America must advertise America overseas.

Alfred Reeves stated that at the present time the Export Committee of the N.A.C.C. was actively engaged in conjunction with the authorities in Washington on the subject of taxation and that although at this time nothing definite could be said regarding taxation on exports, yet the whole thought lying behind the new measure was that there would be no tax imposed on cars exported either direct from the factory or sent abroad through export houses or shippers.

Within a few days it is expected that a primer covering the whole situation will be printed and distributed not only to manufacturers but to every internal revenue department in the country. This course has been adopted by the N.A.C.C. to obviate all possibility of misunderstanding as to the actual conditions.

Roy S. McElwee, assistant chief of the Bureau of Foreign and Domestic Commerce, in the course of his address made a number of pertinent suggestions dealing with the subject of service in foreign countries. He pointed out that a fundamental principle to be observed, if the United States is to maintain its present position of the leading exporter of the world, was that of rendering adequate and prompt service at least equal to that afforded by foreign manufacturers.

He gave concrete instances of his personal experiences in handling agricultural machinery and emphasized that the primary mission of the American automotive manufacturer was to establish himself in the foreign mar-

(*Continued on page* 572)

Export Epigrams

The United States has been a slumbering giant in the matter of export trade.—Drake.

No Orphan Annies should be permitted to compete with our standard automotive products in foreign countries.—McElwee.

European tariffs and embargoes are a temporary fence which will be pulled down as soon as demobilization is effected and normal commercial conditions have been restored.—Domeratsky.

The big commercial mind is beginning to realize that unless the community is served trade relationships abroad cannot endure.—Walker.

Keep our ideals high and our hands clean.—Drake.

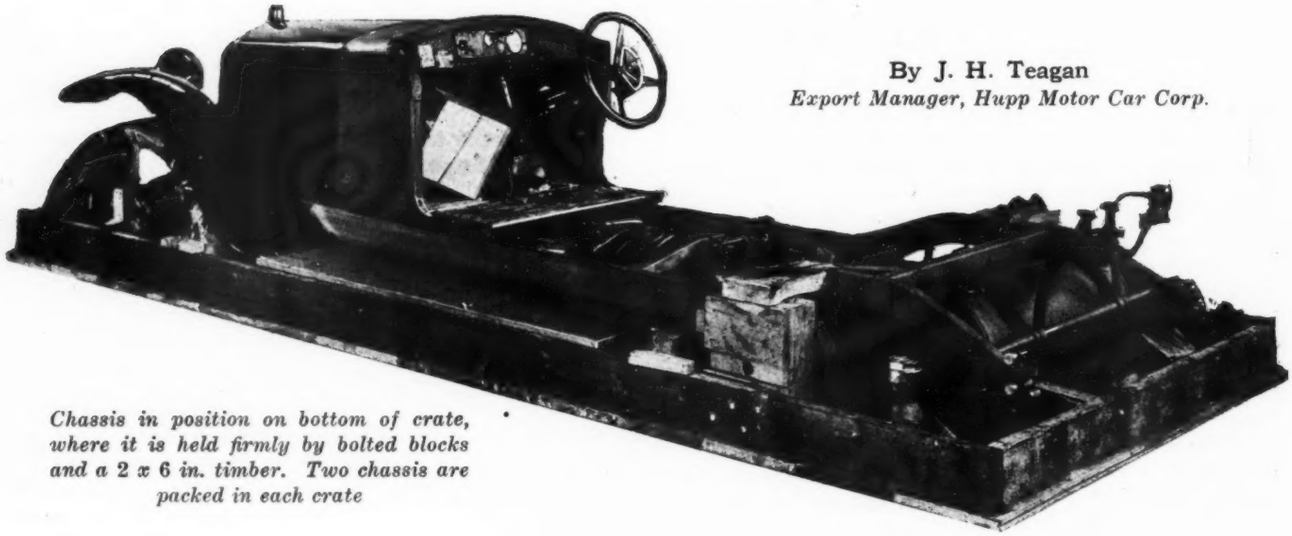
The world is an expanded home market—don't conduct your foreign trade differently from your domestic business except those modifications necessary to meet foreign conditions.—Walker.

We must so establish ourselves in the foreign markets that the consumer will not realize the fact that our products had their manufacturing origin 5,000 miles away. We must give adequate and prompt service.—McElwee.

Crating Automobiles for Export*

Demonstrating How Absolute Security Combined with Minimum Waste of Space May Be Attained

By J. H. Teagan
Export Manager, Hupp Motor Car Corp.



Chassis in position on bottom of crate, where it is held firmly by bolted blocks and a 2 x 6 in. timber. Two chassis are packed in each crate

AMERICAN manufacturers have in the past been criticised for their methods of packing and crating exported commodities, and American methods have been compared adversely with those of competing foreign exporters, indicating that customers abroad find our methods far from satisfactory. It seems to me that this question is so important to all exporters that a discussion of our methods and a free interchange of ideas and suggestions, tending to improve these conditions, should be of interest to the manufacturers represented at this meeting.

If American manufacturers expect to maintain their positions as exporters, they must study the requirements of their customers, and endeavor, if possible, to satisfy those requirements, going as far or farther than competitors in other countries. American goods of every kind must be at least as satisfactory in quality, as reasonable in price, as well delivered, and the customer's good-will as well guarded as is the custom of our competitors.

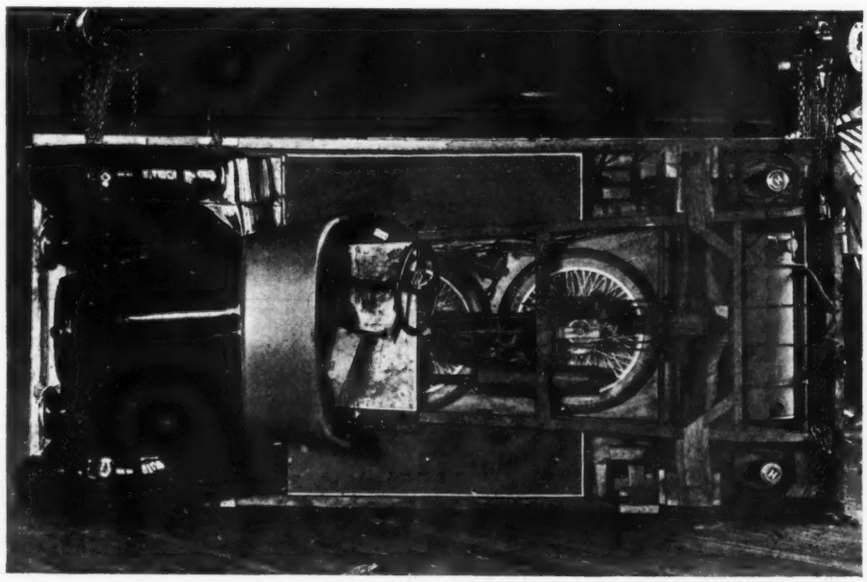
At our factory we have experimented with different types of crates, covers, paper packing and rust preventives. We have been helped by suggestions from our foreign customers and travelers, and by our study of the methods of other manufacturers of automobiles and commodities. We are still far from satisfied, but do know that our efforts have resulted in a great improvement and that customers abroad speak of it.

As the customer is charged for crating, it is essential that we keep the cost as low as it is possible and still insure the safe, undamaged arrival of the goods.

The following is the method which we have adopted. It is better than any other which we have tried, and protects our car from dust, water and damage by the elements or rough handling. Reports indicate that goods packed in this way are reaching our customers in as good condition as they left the factory.

Immediately after the car has been tested and washed it is driven onto the crating room floor, where we immediately apply to all nickel parts a rust preventive, and for this purpose we have been using a liquid called Corol. This, we believe, is the best rust preventive for nickel parts that can be found, and is easily removed. The British Government approved Corol after a very careful investigation, and specify it to be used on all of their shipments.

After the application of Corol the car is driven onto the bottom section of the crate. Surrounding this section are the

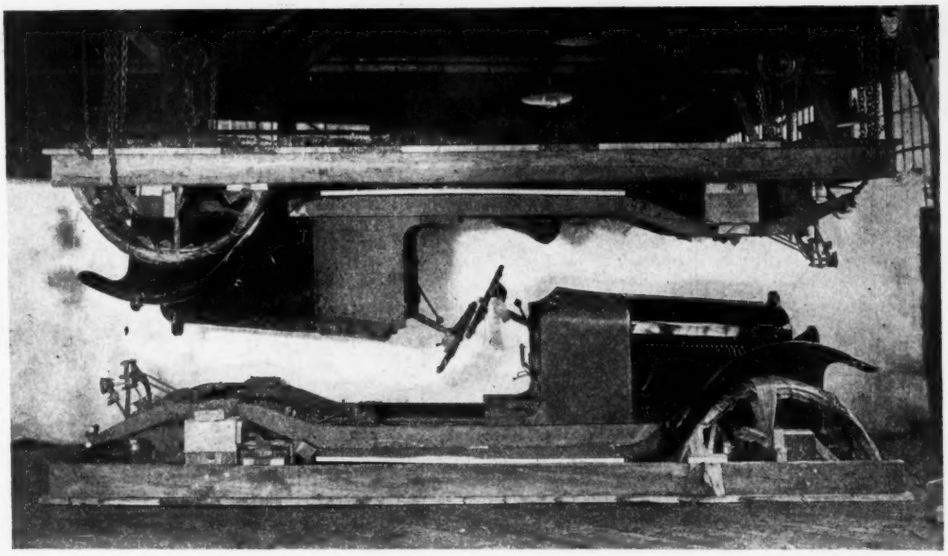


This illustration gives a good idea of how every available inch of space is utilized. This is of primary importance, as freight is charged by cubic feet

*Paper read before Export Managers' Convention, New York, March 7.

side sections and top of the crate. As the car is disassembled the parts are laid in position on the side and top sections of the crate. I emphasize this, as so often parts are taken from the car and mislaid and not put in the crate with the original shipment. Placing all the parts removed on the sections of the crate has eliminated most of this trouble.

The car is suspended by means of chain falls. Wheels, windshield and top are removed. The top carefully wrapped in burlap and fastened to the top section of the crate, directly over the position of the engine. The windshield is crated in a small box and fastened to the top section of the crate, immediately over the tonneau. Two wheels are fastened to each side section of the crate. They are secured with half-inch bolts.



Showing the method by which the chassis secured to the top of the crate is lowered into position before the ends and sides are attached

The steering post is dropped. Shackle bolts are removed and springs are compressed and held in this compressed position by means of metal straps. Brake rods are unfastened at one end and the loose end tied with burlap to the propeller shaft. This, you will readily see, makes a very compact package and reduces the cubic feet required.

The spark plugs are all removed, carefully and thoroughly oiled, placed in a leather bag and fastened to the control levers. The spark plug holes in the top of the cylinder block are tightly corked.

All of the oil is thoroughly drained from the car, also all gas and water, and the water inlet hose is disconnected at one end to insure the thorough drainage of the radiator. This prevents the dealer, when the car is reassembled, forgetting to fill the radiator.

The motor and all mechanical parts are sprayed with a mixture composed of vaseline and gasoline, which acts as a rust preventive and is easily removed. At one time we even coated the cylinder walls with a heavy oil, but this has not been found necessary and has been abandoned.

While the car is still suspended, we fasten over each rear axle spindle a 5 x 10-in. block, which has a hole bored in the center, and a 6 x 6-in. block over each of the front axle spindles. The car is then lowered to set on the bottom section of the crate, and the blocks over the axles are securely fastened. A 2 x 6-in. timber is then fastened to the tops of these blocks, which acts as a wedge from the frame to the side of the case, preventing the car from moving about, regardless of the position in which the crate may be placed.

We have found that if the car is securely fastened in this way the crates can be loaded, setting on the narrow side, and permitting four crates on the platform on a small freight car, thus obviating decking one machine over the other.

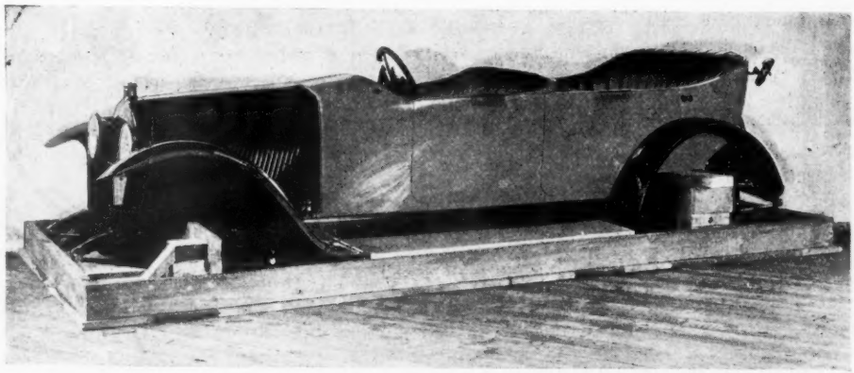
The car and parts being now securely fastened to the sections of the crate, the sides and ends of the crates are placed in position and the top section mounted, securely nailed and ready for loading.

We make our crates of 1½-in. tongued and grooved lumber, selecting the best possible quality, free from knots. This lumber is used for the top, bottom, ends and sides, braced by crosspieces, 2 x 6-in. timbers. The inside of the crate is completely lined with Kraft waterproof paper. Formerly, in addition to lining the box, we covered the car with a Safepack paper envelope and also covered the crate, after loading on flat cars, with a waterproof paper. With the type of crate outlined these last two precautions seem unnecessary.

We ship two chassis packed in one crate, fastening one to the floor section of the crate and the other to the top section. When chassis are shipped the wheels are fastened underneath the chassis.

We have tried to compress our shipments into the smallest possible crate and now cannot find any further way to reduce the dimensions, there being only ⅛ in. between the high point in the automobile and the top sections. The bottom of the differential gear housing comes within a fraction of an inch of the 1 x 6-in. timber which runs along the center of the bottom section. Only ¾ in. clearance is allowed between the edge of the fender and the side section, and less than that between the end of the springs and the timbers of the crate ends.

The question of crating cannot be given too much attention. It would seem to me that the aim of the export men should be to see that not only *their* cars, but all other cars, and all other products exported, are laid down at destination in such good order that no customer could ever complain of American methods, and I would suggest that a small committee be appointed to tabulate the methods used by various automobile manufacturers, asking each one freely to give all the information that he has regarding costs, and also any complaints or compliments that he may have from his customers regarding the method used. Copies of this tabulation could be sent to the various export managers and should result in improvements and possible economies to many of us.



Complete cars are packed singly and are held so securely that the crate may be placed on its side without damaging its contents

Suggested Combinations Under Webb-Pomerene Law

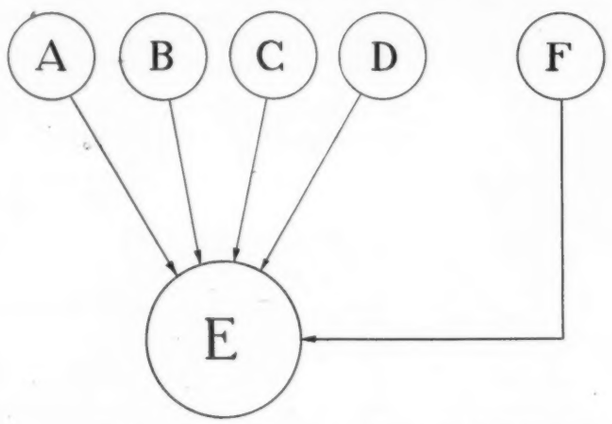


Fig 1—This represents the normal (and therefore ideal) form of combination for export.

A, B, C and D are four individual companies desirous of engaging in export trade under favorable conditions. They may be engaged in precisely similar business as in the case of the Copper Export Corp. or they may be engaged in non-competitive lines in the automotive industry.

These four companies form themselves into a single export association or corporation (E) which may either purchase the products of all outright and of itself accept all responsibility for the entire conduct of export business or it may be simply a unit selling organization acting in the interests of the four and taking instructions as to policy, etc., as applied to all.

It is conceivable that a fifth company (F) may desire to be associated in the benefits of the export association (E) to a limited extent and it would be permissible to so arrange matters that this fifth concern should retain its individuality to an agreed-upon extent, while it would be willing to come in line in matters applicable to all.

It is important to observe that the export association (E) may be only an agent or may be an outright purchaser of the combined products of A, B, C and D. If there should be an (F) it would be subject to terms to be agreed upon.

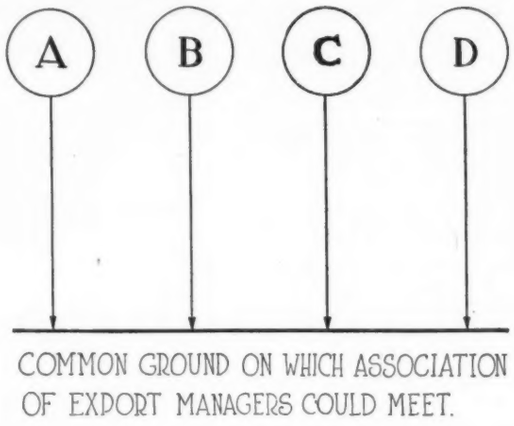


Fig. 2—In cases where the normal method of combination, as shown in Fig. 1, cannot be adopted owing to circumstances affecting the relative positions of the companies desirous of engaging in export trade, the following solution is suggested. It is understood that this method has been under consideration by the Federal Trade Commission and that they are inclined to agree that it offers a practical solution of what may be termed a half-way stage to a more permanent and unified plan.

Take four concerns, A, B, C and D, all of which have foreign connections and are at the present time engaged in export trade along lines or involving methods which are fundamentally different.

Assuming that it is impossible to unify the foreign business of these as in Fig. 1, it is suggested that the export managers of all four be formed into an unincorporated association registered in Washington.

This unincorporated association would be in a position to meet and agree upon co-operation in such matters as shipping, prices, joint stockrooms or anything else on which the four firms could have a common ground of operation.

This plan, while admittedly not perfect, would enable A, B, C and D to preserve their respective individualities, to avoid cut-throat competition and to effect considerable saving in expense in those matters which are common to all.

Export Managers Enthusiastic

(*Continued from page* 569)

ket as to make his customer unaware of the fact that his goods were manufactured 5000 miles away instead of just around the corner.

Mr. McElwee admitted that while such a proposition was a comparatively easy problem for the larger manufacturer, it was not quite so simple for the smaller exporter with relatively limited resources, and to overcome such a difficulty he suggested the possibility of co-operation between non-competitive lines in the matter of using a common stockroom for spare parts, sharing offices, etc., but maintaining individuality to a greater or lesser degree in the matter of sales methods if it were found impossible to do otherwise.

He insisted that "an embryo home office" was a primary necessity to the successful conduct of an export business, stating that even if such an office in Bordeaux, Marseilles, or elsewhere abroad simply consisted of a desk and a telephone it gave a sense of security to the purchaser. He said that such an office should be supplemented by the use of stationery bearing its address and that the adoption of such a course did not mean that the salesman had to stay indoors to answer calls so long as he could arrange for queries to be received and held for his attention.

Mr. McElwee spoke at some length on the absolute necessity of cars and trucks exported being representative of standard American practice and suitable for the purposes for which they were designed. He said, "No Orphan Annies should be allowed to compete with our standard products abroad. It is a case of the United States against the world, and an individual break-down means that every American product suffers by inference."

Louis Domeratsky of the Division of Foreign Tariffs of the Bureau of Foreign and Domestic Commerce announced his readiness to answer questions relating to the present position in regard to restrictions, tariffs, etc., and in response to many queries gave information which served to clear a number of debatable points. Obviously, there are many matters which are still in doubt, but the sum-total of Mr. Domeratsky's opinion was along the following lines:

Status of British Embargo Indefinite

It is impossible at this time to say anything definite regarding the British embargo, but it is evident that no country can maintain an embargo indefinitely. It may impose prohibitive import taxation or tariff. The British automotive industry, as also the French, considers it has claims on its government on account of war services rendered and that it merits a meed of protection.

It is believed that there is no restriction in either country on the importation of farm tractors. Tariffs are a temporary fence erected to stay only until demobilization has effected a return to normal conditions.

In response to questions, Mr. Domeratsky stated that his department experienced no reluctance on the part of foreign governments to give full information in regard to tariffs and restrictions.

Prefacing the remark by the statement that it was not an official statement, Mr. Domeratsky gave it as his

opinion that England was at the present time taking advantage of existing conditions to advance her theories on tariff reform and because of sentimental and perhaps political reasons. He added that it should not be forgotten that England was a commercial as well as a manufacturing country and that undoubtedly she would be glad to see the abolition of all restrictions affecting the import of foreign-made goods.

In response to a question, Mr. Domeratsky said that he could not give any information as to why it was possible to receive coded cables from England but impossible to send them from here. He also stated that while French tariffs applied to France's colonial possessions, Great Britain's tariffs did not apply to British colonies. A further question in regard to a possible list of present tariffs and restrictions was answered by Mr. Domeratsky referring the inquirer to a recent issue of AUTOMOTIVE INDUSTRIES in which complete data were published.

The matter of restrictions on car exports to Australia, where two chassis must be sent for each complete body exported, was raised. It was explained that this restriction was designed to encourage Australian body builders.

Mr. Domeratsky pointed out that in the event of stocks of parts being held at a free port, they could be shipped thence to any point, paying the duties called for at the ultimate destination but escaping intermediate duties in countries passed en route by being shipped through these in bond.

The Webb-Pomerene Law

Allen Walker and Gilbert H. Montague, both of whom assisted in the preparation of the act known as the Webb-Pomerene law, which provides for the combination of competitors for export selling, spoke at length on the advantages conferred on automotive manufacturers in the opportunity afforded under the new law to effect combinations for the purpose of conducting export business in a manner which simplifies operation, reduces expense and confers the full benefits of co-operation.

Mr. Walker outlined the main points of the law and mentioned the efforts which had been made by the Guarantee Trust Company to obtain commercial information sufficient to create a directory or "Who's Who" of foreign trade, a compilation which now contains 60,000 names and ratings.

He pointed out that trade combinations already effected had proved beyond the shadow of a doubt that all business conditions could be met and all problems solved irrespective of the apparent impossibility of adjusting conflicting interests where it was sought to associate large firms with an existing foreign trade connection with smaller concerns who had not engaged in overseas trade.

American manufacturers are forgetting petty differences, he said, and are getting together for the development of foreign trade on the general principle that nothing matters but the common good and that the community must be served if they are to succeed.

Mr. Walker instanced the British Empire League as an association termed to develop a bond of sentiment, to emphasize the fact that self-interest alone was useless when confronted by foreign trade conditions and to point out continuously that national pride in the Empire's products was an essential to successful export.

He said, in effect, that the shelves of the world were empty, that it was the time when we could perfect our plans for filling them and keeping them filled, and that the world should be considered simply as an enlarged home market where nothing need be changed in business methods except in so far as it might be necessary to meet a country's individual conditions, manners and customs. Mr. Walker mentioned that active steps had been taken to counteract propaganda having for its object misrepresentations of the real object of the Webb law in various foreign countries—notably in Latin America and Australia.

How Export Combinations May Be Effected

Gilbert H. Montague, who has been engaged in the formation of the Copper Export Corp. and a number of other combinations under the Webb law, spoke of the various ways in which complete or partial associations could be formed to carry on export business.

He referred to the fact that if circumstances did not seem to warrant a close combination where a number of firms pooled all their export interests through a single association and sold their products solely through that association, there were other ways of solving the problem.

He illustrated a few of the alternatives by means of diagrams, showing that it was possible to enter into export combinations in such a way as to preserve existing interests in the case of one or more of its members who might be in a better position to engage in export trade than were other individual members of the same combine, without injustice to any one of them and with marked advantages to all.

The principle upon which these combinations are being effected is that matters must be so arranged that no one member can lose the benefit of anything which has been done and that all shall gain the advantages of co-operation without losing their respective individuality.

Such matters as advantages conferred by factory location in relation to the seaboard whereby one member of an associated group would normally reap the benefit of lower freight costs and under the older conditions could cut prices on this account have been eliminated in favor of an averaged flat rate based on the cost of freight from all the factories in that particular combination.

Our New Ships

Ira A. Campbell, Admiralty Counsel, United States Shipping Board, spoke of what had been accomplished in the construction of new vessels, the acquiring of others, the difficulties of the past and the hopes for the future. Mr. Campbell did not make any statement regarding the actual number of ships available over the various trade routes for commercial shipments at the present time.

He outlined the number of vessels and the total tonnage available at the signing of the armistice, mentioned the tentative program which normally should have been in effect at the present time and stated that the Board's plans for the transfer of shipping to strictly commercial service had been completely upset by the European food shortage, which necessitated the diverting of much tonnage for the time being.

He referred to the possibilities of the future in reference to the ultimate ownership and operation of the now Government-controlled ships and made suggestions covering alternative methods of keeping them in effective service in advancing the export trade of the country.

Registration of Trademarks

James L. Steuart impressed upon the delegates the absolute necessity for protecting trademarks, pointing out that the law of the United States, where the adoption and use of a trademark gives right and protection, differs from that of foreign countries. Abroad, said Mr. Steuart, countries do not recognize such rights, but provide statutes permitting a manufacturer to apply for the

right to register a trademark—the first to register getting the right and protection.

He added that this state of affairs had caused much trouble and expense to American exporters owing to the facility with which a United States trademark could be registered abroad by anyone who thought he saw an advantage in controlling that trademark in a given country.

This practice has grown to such an extent that there have been cases where United States trademarked goods have been refused admittance at foreign ports on the application of some individual totally unknown to the manufacturer of those goods, but who had realized the opportunity for something little, if anything, short of blackmail. Mr. Steuart gave specific instances of hardships of this nature inflicted by piratical persons on American manufacturers and impressed on the convention the necessity for having trademarks protected abroad.

Foreign Selling Problems

George H. Smith, president of the American Manufacturers' Export Association, outlined the entire position of the United States manufacturer in relation to export trade and its possibilities, touching on the changed conditions and the keener competition which may be expected in the future.

"At the very outset," he said, "let me say that while the present obstacles to the development of our export trade are serious and real, there is not one which cannot be surmounted by the manufacturer who is determined to make export trade a definite and permanent part of his business.

"A great part of the world is laboring under a burden of debt and difficulty brought about by the war, but when readjustments are made (and they must be made quickly) there will be inevitably a tremendous demand for those American products which other countries must have if they are to win their way back to normal conditions.

"There is a responsibility as well as an opportunity for the American manufacturer in the field of foreign trade. The country is gradually beginning to realize that to maintain the production of the United States at its present high peak and to offer employment to the workmen of America, the nation must build up the permanent foreign markets which belong to it because of its natural aptitudes.

"The automobile manufacturer who has the courage and the energy to develop his foreign sales is, therefore, not only performing a service for himself, but by adding to the volume of his country's exports is performing a distinct economic service for his country."

Packing for Export

J. H. Teagan gave some practical advice on the subject of packing passenger cars for export as done by the Hupp Motor Car Corp. The address was highly instructive and the photographs which were passed around were examined with interest. As the subject is of general trade importance some of these photographs are reproduced, together with a synopsis of Mr. Teagan's talk, on pages 570 and 571.

Peter S. Steenstrup, general manager of the General Motors Export Co., pointed out that successful advertising methods abroad differ in important respects from the methods adopted with success in domestic advertising; that trade literature should be in the language of the country where it is circulated; and that the possibility of co-operative advertising by members of the N.A.C.C. should be considered.

Mr. Steenstrup referred to the fact that our wholehearted participation in the war had given us a higher standing in the British colonies and in many other countries and that the present time was ideal to thoroughly establish ourselves in the overseas markets. He said: "The time to advertise is now, and the present unusual opportunities, if neglected, may never present themselves again."

All features of advertising were given full consideration, methods of placing overseas advertising were dealt with, suggestions on many points were made and in giving a list of American export journals which he described as "excellent mediums to reach overseas jobbers, dealers and agents," Mr. Steenstrup said: "There is but one American automobile trade publication with a large overseas circulation, *El Automovil Americano*, a quarterly published in Spanish by the Class Journal Co."

D. B. Richardson, foreign sales manager of the Studebaker Corp., made reference to the present popularity of the clincher type of tire in most foreign countries, a circumstance which he attributed to the early influence of the Michelin tire. The many advantages of the straight-side type were pointed out and it was suggested that both car and tire manufacturers co-operate to standardize the use of this type not only for the reason that it would be advantageous to both but that it would also confer an appreciable benefit on the user.

It was admitted that in Continental Europe there would be but little prospect of bringing this change about, but it was the opinion of the writer that it was quite practicable to standardize the straight-side tire elsewhere.

Right-Side Steering

Right-side steering is, in the opinion of Mr. Richardson, an essential for cars exported to countries where the rule of the road compels drivers to keep to the left. Under such conditions the difficulty of signaling an intention to turn is greatly increased by the use of left-hand drive and, as one of the delegates pointed out, the left-side location of the steering wheel may mean that a front-seat passenger has to alight in the roadway—possibly in mud—unless the driver first gets out and the passenger crawls under the steering post.

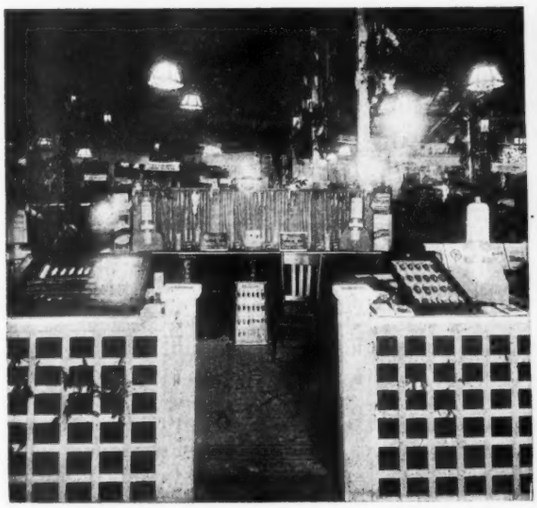
This paper concluded the regular session, but, in response to the request of the chairman, H. M. Robins of Dodge Bros. gave an interesting account of his impressions of the automotive industry gathered during a recent tour of England and France. C. J. P. Lucas, Chicago, spoke regarding the possibilities of railroad co-operation with exporters and referred to the fact that from March 15 both United States and Canadian railroads would issue through bills of lading, make out consular documents, etc.fi for any part of the world.

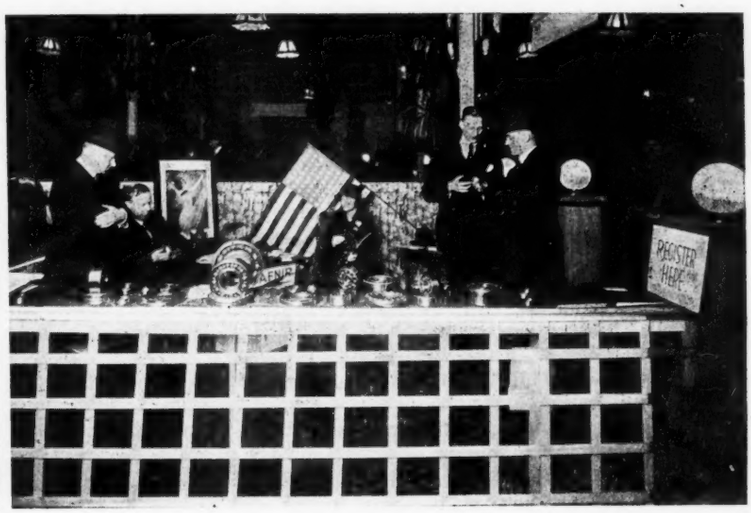
Light as Deteriorating Factor in Airplane Fabrics

SPEAKING before the Royal Aeronautical Society on the strength and deterioration of fabric and dope used for aircraft, Dr. F. W. Aston said that sunlight was the only serious agent in deteriorating the strength of doped and undoped linen aeroplane fabric. The change in rate of loss of strength was very great in summer and practically negligible in winter. Once the action of light was prevented, doped fabric was capable of sustaining continuous exposure for several years without dangerous weakening. Unprotected doped fabric lost about 12 per cent of its strength in a single average English summer day at sea level, and the rate was enormously greater at high altitudes above the clouds.

Rapid as the deterioration was in the case of an English machine, in the case of an enemy Albatross scout, captured practically brand new, it was even worse.

Good Exhibits at Kansas City Tractor Show

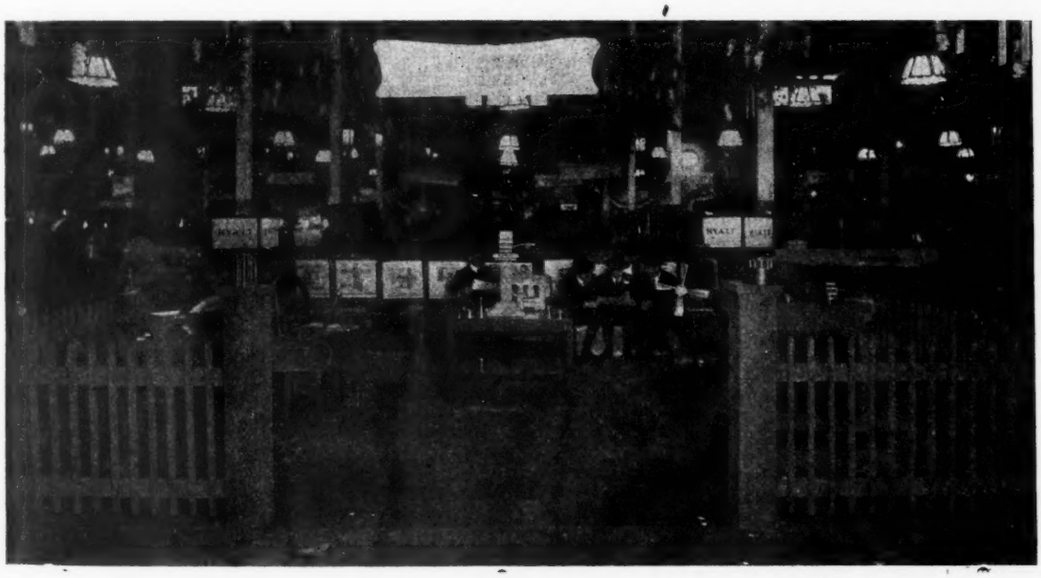




The Champion Spark Plug Co. is about the most show-going corporation in the business, and it always has a good exhibit. This set-up at the Kansas City tractor show is typical in that it has a Champion look

At the right of the Champion picture is the very good exhibit of the Fafnir bearing company. This was but one of many exhibits of the industry's best parts makers

And here is Standard Parts. With many others, it was alert to the opportunity of getting in touch with the growing tractor industry



Hyatt roller bearings had quite a lot of room, where interested engineers, farmers or any one else could come in and sit down and talk over the merits of the product. A place to sit down and talk is a big show asset

Egotism in Business a Grave Error

Consulting Engineer Can Help to Guide Executives Along Broader Lines of Progressive Thought—Quality the Eventual Criterion

By J. Edward Schipper

SELF-SUFFICIENCY is as bad for a business organization as it is for an individual.

It builds up a Chinese wall around the organization which eventually becomes fatal. Millions of dollars have been lost during the history of the industry because of this fault being carried to an excessive degree, and it is upon one of the most important methods of remedying this fault that the following observations are given.

We cannot see ourselves as others see us. Neither can we judge the product of our own hands and brains as others judge it. As every manufacturer knows, the history of his product has just begun when he has put an experimental model through its paces and finally puts it into production. It is the public or the consumer which must be the final judge.

If the public or consumer judges adversely, millions of dollars may be lost, or sums of money may be lost which are fatal to the success of the concern which loses it.

Influence of Public's Judgment

If the public judges favorably, then the opportunity is often open to fortune. It is true that the judgment of the public or consumer may be swayed by clever salesmanship and a trained and good sales organization, but even with this factor considered it is far easier for the salesman to sway the public in favor of something which is really good throughout than it is to attempt to put over a product which is weak in some vital feature.

It is a mistake for a manufacturer to attempt to bring out a new model along different lines from its predecessors without calling in the assistance of outside talent such as a consulting engineer or some advisory counsel.

Frequently our manufacturers rely too implicitly on their own engineers, expecting them to cover not only the entire field of design itself, but also to be able to project themselves into the future to the extent of knowing definitely the trend of engineering progress and the trend of popular demand.

The men who have a knowledge of both these phases of engineering work are rare indeed; in fact, it is questionable whether they exist.

A man who is thoroughly capable in detail design is rarely if ever capable of properly judging the commercial or sales angles which must always be considered in a new product. A man who designs the details of the engine knows little or nothing as a rule about the popular requirements in the line of appearance. Plant men as a rule are detail men.

The consulting engineer is a man who, being removed from the necessity of concentrating on particular details, has a wider vision and a broader aspect than the plant engineer. He should be called in to help paint the general picture of a design before the design ever gets any further than the drawing board. He should be fortified with such a store of engineering knowledge that he knows the weak and strong points of every kind of design, and will be able in advance to clear the way of troubles which are always sure to occur when a product is designed from the details out toward the finished product.

Too often the logical process of design is reversed and an automobile, for instance, will be built around an engine, or a truck will be built around an idea of spring suspension; and while the particular engine or the particular spring suspension may be the best in the world, there are too many instances where the vehicle as a whole has failed because the specialist failed to call in outside help to assist him maintain the proper balance between his own knowledge and what he has taken for granted from existing practice.

Probably never again will the automotive industry be in the condition that it is to-day. While on the surface there are many things which are disadvantageous, on the other hand we now have the opportunity for laying a foundation for future developments which will never come again. We have been given a fresh start and still are able to use the experience of past years.

One of the lessons that we should draw from this is that in the past we have not been particular enough as regards the quality of our products, but our industry taken as a whole has suffered the fault committed by many. It has been too eager for quick returns. If we have a national failing it is that we look for quick turnovers from our industrial projects.

Must Build for Quality

Rather than building for the permanency of a product, we have been building, in many cases, for the profits which could be extracted from the product within a few years. *One of the greatest means of combating this tendency is going to be in the use of men of broad vision and wide experience who can judge our products, not from the standpoint of how much money is going to be made on it, but from the standpoint of quality.*

The proper use of consulting engineers in this profession will do a world of good in creating new standards and higher planes of development for automotive products. A consulting engineer should not be called in solely in times of trouble. He should be called in more or less regularly on various lines of thought.

A consulting engineer should build up around himself a complete arsenal of engineering information as well as maintenance problems. Abroad there are many concerns of consulting engineers which are held in high esteem, and with the size of the industry in this country there should be many such who would be in a position to do the industry a great service if they were correctly trained to handle their work.

Not only can the consulting engineer help to pilot the engineering staff of an organization along the proper general lines, but he can often, through his experience, foresee trouble which if permitted to pass might ruin the reputation of a company. More than one concern has suffered materially in reputation for an error which allowed a weak link in its chain of construction.

We can call to mind a concern which was ranked among the biggest and most successful in this country not over four years ago. Three or four bad mistakes, one after another, any one of which would have been readily detected by an outside engineer of experience, were allowed to escape the vigilance of the plant engineer.

The result is that this company has lost all of its holdings and is only a mere shell of what it might have been had the proper care been concentrated on its product. One line of models had so much trouble with the rear axle that it was necessary to call in hundreds of these axles and replace them with new ones. It was necessary for the same concern to put scores of men on the road replacing pistons, which, because of faulty design, failed as soon as they got into service.

Following this a model which should have never been allowed to go further than the drafting board was put out with results that were disastrous and because of these mistakes the company shrank from an independent, wealthy concern until it now holds but a minor position in the industry. This is only one of the stories of what might be told of where the high ideal of quality performance was not kept in mind in designing the product, but rather where the cheapest thing that could be used was utilized to get by with on this car.

Should Design for Service

The fear of every manufacturer is what service problems he is going to run into after his product gets in the hands of users. One of the biggest reasons for this is that the problem is not fully considered *before* the product is designed, but only after it is ready to sell.

America is about to enter into a great contest for world trade. We have had a reputation, perhaps not undeserved, of building products cheaply but not enduringly.

The war has changed this to a great extent and countries which have hitherto kept closed doors for America's products are now ready to open them if we but step forward with the proper class of goods. This is an opportunity for which we might have had to wait a half century had not the war occurred, and it would be criminal folly to fail to take advantage of it or to destroy this wonderful opportunity by attempting to place before the markets of the world products which are not built on the ideas of quality and service.

The consulting engineer knows through his broad experience that it is possible to build a cheap product and sell it once because of its price, but it is not possible to secure repeat orders from the customers who have tried the cheap product and found that it does not give the service.

For this reason the consulting engineer is bound to be a weighty factor in demanding quality in the products with which he has anything to do. It is simply a matter of building a permanent re-order business, rather than a single-order, short-lived concern, which may flare up as a quick success, but which will not endure in anything like the manner of a concern whose product is built on a higher plane of standards.

There is some reason why in 1912 in this country there were something like 350 manufacturers of passenger automobiles, while in 1919 there are about eighty-five. Those who have survived have not been the ones who have tried to make an instantaneous financial success. Those who remain have always the temptation before them to cut down on quality and go up in annual profits.

But it is going to be the salvation of our industry and one of the greatest determining factors in the commercial standing of America in the world market if we will but make quality and not profit the chief consideration.

A consulting engineer who handles his work along these broad lines should be in the greatest demand. He can enter a conference with his broad view and bring out in discussion matters which probably would not occur to those who are connected with the plant organization.

It is not the consulting engineer's function to determine matters of policy or to entirely design a product unless under some special circumstance. It is his duty rather to see that in laying out a project all sides of the matter have been given due consideration and after this decision has been reached, he should assist in interpreting it in future production in the broadest and most accurate light.

A man who has made consulting engineering as pertaining to the automotive industry a study states that the consulting engineer's work can be considered under five headings:

1—Confirmation.
2—Criticisms.
3—Improvements and refinements.
4—Creation.
5—Checking and testing.

In considering these heads it can readily be seen that the matter of confirmation is of the highest importance because not only does the confirmation of the views of the factory men give them an infinitely greater confidence in their own judgment, but it makes a huge psychological difference to the entire plant, giving them greater ability to go ahead and push the project to a successful determination.

The statements of a consulting engineer in confirming from a broad viewpoint the detailed decision of a plant engineer are of the highest importance to the sales manager because they furnish him with the best kind of ammunition for his sales campaign.

Sales Problems Are Important

Often the sales manager will differ with the decisions made by the engineer of the plant. This condition is not healthy from a sales standpoint because it is a well-known principle of merchandising that before a man can sell well he must first be sold on his own product. The confirmation of a consulting engineer of high standing of a definite engineering policy decided upon by the plant engineers will have a wonderful effect in this direction.

Criticism by a consulting engineer must be taken in a broad way. The plant engineers must realize that constructive criticism by a consulting engineer is no reflection on their ability. Too often the petty fear of a plant engineer that his knowledge and effort will be discounted has precluded the use of a consulting engineer, when that use might have been worth thousands of dollars to the company.

A consulting engineer, knowing from his storehouse of engineering information the proper materials and proper design, or proper manufacturing methods to utilize in taking care of a product designed to fulfill certain requirements, can be a wonderful benefit to a plant.

Often important features can be improved and simplified by suggestion and by careful discussion. Manufacturing costs may be cut by a suggestion given as a result of the wide experience of the consulting engineer. The field of criticism is a fruitful one and has marvelous possibilities in the way of money saving and manufacture and trouble saving after the product is on the market.

As the art progresses refinements and improvements always suggest themselves in any product. From time to time factories have announced that they were ready to stand pat upon designs previously brought out and completed. In a sense they have said, "We have reached perfection and we know of no further refinements to incorporate in our product."

(*Continued on page* 595)

Tests of Ignition Apparatus

A New Porcelain Developed Having High Insulating Qualities at High Temperatures—Resistance to Thermo-Cracking and Shock and Gas-Tightness of Plugs Also Investigated

By P. M. Heldt

IN 1916 the Bureau of Standards was asked by the National Advisory Committee for Aeronautics to undertake a study of spark plugs, and this work was later extended to cover other ignition problems. Reports from abroad indicated that one serious trouble with spark plugs was failure of the plugs due to electrical conduction through the insulation. The ceramic laboratory of the Bureau, which is located at Pittsburgh, undertook to develop compositions of porcelain which should meet the requirements of spark plug insulators better than any available up to that time. A large number of compositions were made up and tested for electrical resistance at high temperature, for resistance to thermal cracking and for resistance to mechanical shock. In the test for resistance to change of temperature the porcelain was raised to a high temperature and then suddenly cooled by plunging it into an oil or other bath, after which it was examined for cracks or fissures. In these tests for resistance to mechanical shock the spark plug was screwed into the side of a block of metal which was struck violently against a steel anvil by means of a cam mechanism.

As a result of these tests a material was developed which was superior to any formerly in use. The formula of this composition has been furnished by the Bureau to a number of spark plug makers and may be had by any interested concern on application. The material is now in production by one of the largest manufacturers of spark plugs in the country, and its use is being considered by several others.

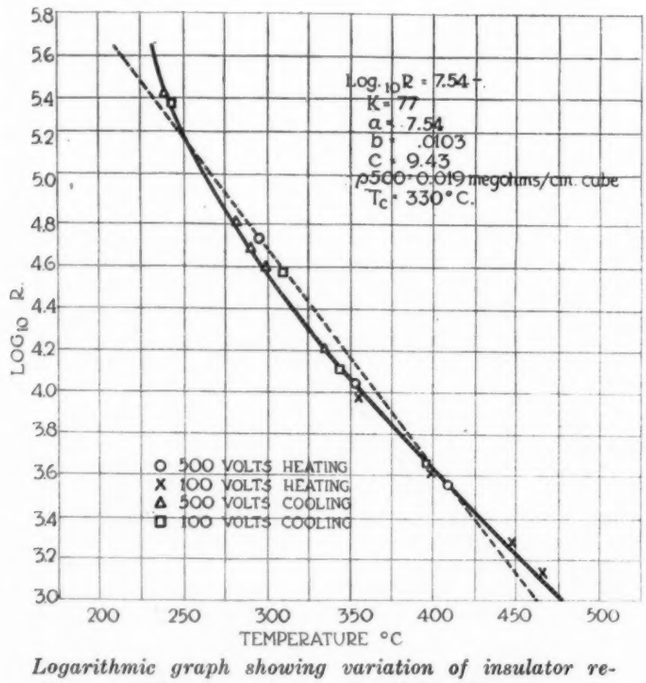
As a result of the conductivity measurements and of measurements of the temperature which the spark plug attains in an engine, it appears that failure of a plug due to conductivity of the insulator occurs only in extremely hot engines. The results of the conductivity measurements were plotted on cross-section paper, and one of the graphs is shown herewith. Instead of plotting the resistance of the porcelain against the temperature, which would seem to be the natural thing to do, the logarithm of the resistance is plotted against the temperature. The reason for this is that while the resistance varies enormously with slight changes in temperature, the logarithm of the resistance varies nearly linearly, and a nearly straight line is obtained, the inclination of which can be made anything desired by a suitable choice of horizontal and vertical scales. From this curve the resistance at any temperature can be read off.

In the course of the experiments it was found that in high power aviation engines the inner end of the porcelain may reach a temperature of 900 deg. C., but the body of the porcelain seldom exceeds a temperature of 250 deg. C.

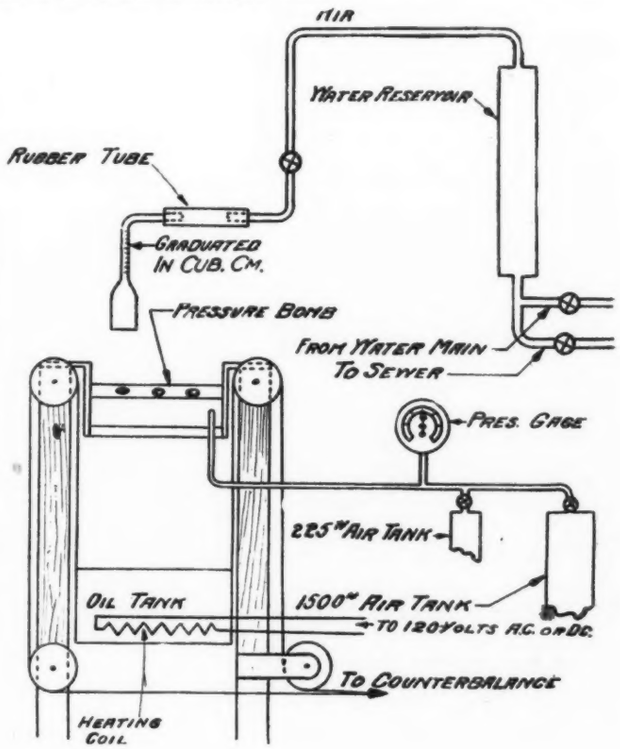
The following table gives the principal results of resistance tests on a variety of insulators used for spark plug purposes:

Description of insulator	T_c	Resistance at 500° C. in millions of ohms
Fused silica	890° C.	340
Best porcelain tested	790° C.	80
Typical high grade mica plug	720° C.	70
Average of three aviation porcelains	650° C.	40
Average of three automobile porcelains	490° C.	0.80

T_c is the temperature at which a centimeter cube of the material has a resistance of 1,000,000 ohms.



Logarithmic graph showing variation of insulator resistance with temperature. On right—Apparatus for testing air-tightness of spark plugs



Tests have also been made on the gas tightness of plugs, more than 100 different designs having been tested. Except in cases where the insulator is molded to the metal parts of the plug there is very little connection between the design and gas tightness, the latter depending much more on workmanship than on design.

There are several different methods of insuring a gas-tight joint between the metal shell and the insulator. A great many plugs are assembled with a screw bushing, in which a gasket, either of asbestos thread or copper asbestos, is placed between a shoulder on the shell and a shoulder on the insulator. Other plugs have the edge of the shell crimped over the insulator, while still others depend upon a taper fit, these latter not employing a gasket.

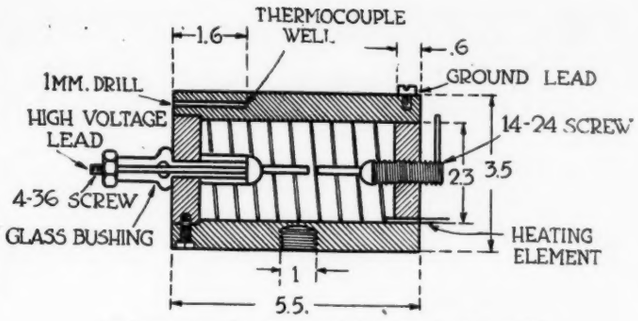
In making a test for air tightness the spark plug is screwed into a pressure bomb, and a bath of oil heated to 150 deg. C. is brought up around the plug and produces a differential expansion similar to what would occur if the plug was in an engine in operation. Then a graduated glass bell is placed over the plug and any air which leaks through is collected therein. The volume of air which collects in a given time is a measure of the air-tightness of the plug. A sketch of the test set-up is shown here, and one of the illustrations shows a few of the plugs submitted for test, practically all of which will be seen to be of the airplane type.

This section of the Bureau of Standards has also made numerous oscillograph tests of magnetos and battery ignition systems for the War Department. Among other testing apparatus the Bureau developed a copper calorimeter for measuring the heat of the spark. A sectional view of this device is shown herewith. The spark takes place inside of a cylindrical block of copper, 2 in. long by 1 in. in diameter, which contains one insulated and one grounded electrode, the spark gap being at the center of the block. The temperature difference between the calorimeter block and another dummy block of similar dimensions is determined by means of a thermocouple, and the whole apparatus is calibrated by means of a resistance coil inside the cylinder through which a certain known amount of electrical energy is sent.

The actual igniting power of a spark depends on many factors which are at present little understood, and the total heat energy is by no means a direct measure of this igniting power. However, it serves to give an index of the total power output of each type of ignition system and forms a basis for a study of the effect of various features of design upon this output.

In arranging the set-up for this test, pains were taken to reproduce as nearly as possible the electrical conditions in an engine while in operation. The spark is produced under atmospheric pressure only, but the spark points are separated further than in the spark plug, to such an extent that the breakdown voltage and the voltage required to maintain the pression.

arc are substantially the same as in an engine under com-



Calorimeter for determining heat of sparks

Measurements were also made of the breakdown voltage of spark gaps at various pressures and temperatures in order to estimate the voltage required to produce a spark in the compressed charge in an engine cylinder. It was found that the spark voltage depends only on the density of the gas, the pressure and temperature of the gas affecting the breakdown voltage only in so far as they have an influence on the density of the gas. These data agree with actual measurements in aviation engines and indicate that the sparking voltage is approximately 6000 volts.

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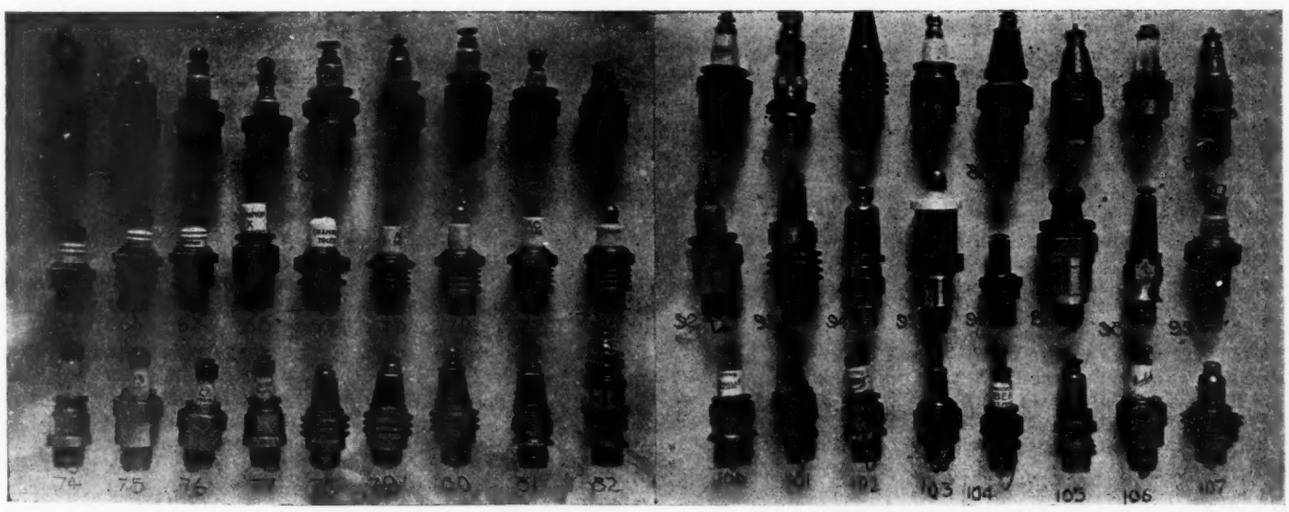
Investigation of Headlamp Glare

ABOUT a year and a half ago the Bureau of Standards started an investigation to determine the character of light distribution of automobile headlamps with various kinds of glare-control devices. Candlepower measurements were made on 20 to 25 different types.

These glare-control devices were divided into two different types, one in which the light distribution is symmetrical around the axis of the reflector and the other in which it is not. With the former type candlepower measurements were taken only in a horizontal plane through the axis of the lamp, through a range of about 10 deg. from the axis. Where the beam of light is not symmetrical to the axis of the lamp, as, for example, with lenses containing prisms which throw the light downward, measurements were made in four horizontal planes 2 ft. apart at a distance of 75 ft. from the lamp.

What started the Bureau on this work was a request from one manufacturer of headlight lenses for a test of his device. Later the work was conducted in collaboration with the Automobile Headlight Specifications Committee of the Illuminating Engineering Society. E. C. Crittenden of the Bureau of Standards is a member of this committee, and he was represented in most of the tests held by the Committee in New York by A. H. Taylor.



Some of the spark plugs tested by the Bureau of Standards

Motor Cultivators at Kansas City

Corn and Cotton Cultivation Problem Solved Along Two Different Lines—Light, High-Clearance Tractors for Use with Horse-Drawn Type Cultivators and Special Machines Fitted with Motor Drive

By P. M. Heldt

KANSAS CITY, MO., March 9—During the past year considerable attention has been given by implement and tractor manufacturers to the problem of a motor propelled or motor-drawn cultivator. It is generally realized that before the farmer can dispense with his horses he must be offered machines for doing all the different kinds of work for which he now uses horses. The ordinary tractor is unsuited for cultivating, as it is much too heavy, has too much power and not enough clearance. There are two possible directions in which a solution can be attempted, namely, by building specially light tractors with high clearance, to which cultivators similar to the horse-drawn implements can be hitched, or by building a cultivator to which an engine, transmission, final drive and steering gear can be applied.

Among the requirements made of motor cultivators is that they should have a considerable range of speed. This is necessary because when cultivating the corn the first time, when the plants are still very small, the machine must be driven at low speed, in order that none of the plants may be covered up with earth. A speed of about 1 m.p.h. is generally considered suitable for this operation. Motor cultivation requires only a moderate amount of power, and there is no doubt that by building a special cultivator to which an engine, transmission and final drive are attached the highest degree of operating economy can be secured.

Practically all the cultivators so far built are of the two-row type. The latter are always fitted with three wheels, two driving wheels of about 40-in. diameter and an additional central wheel, which may be either at the front or at the rear. This last-mentioned wheel of course runs midway between the two rows that are being cultivated. In using a machine of this type care is always taken to cultivate at the same time two rows which have been planted together, as the spacing of these rows is absolutely accurate. The cultivator gangs are guided by means of the feet, and all the operator has to do is to watch one row, as with the rows of corn uniformly spaced and the gangs of the cultivator set exactly the right distance apart, if the gangs are properly guided for one row they will also be guided properly for the other row.

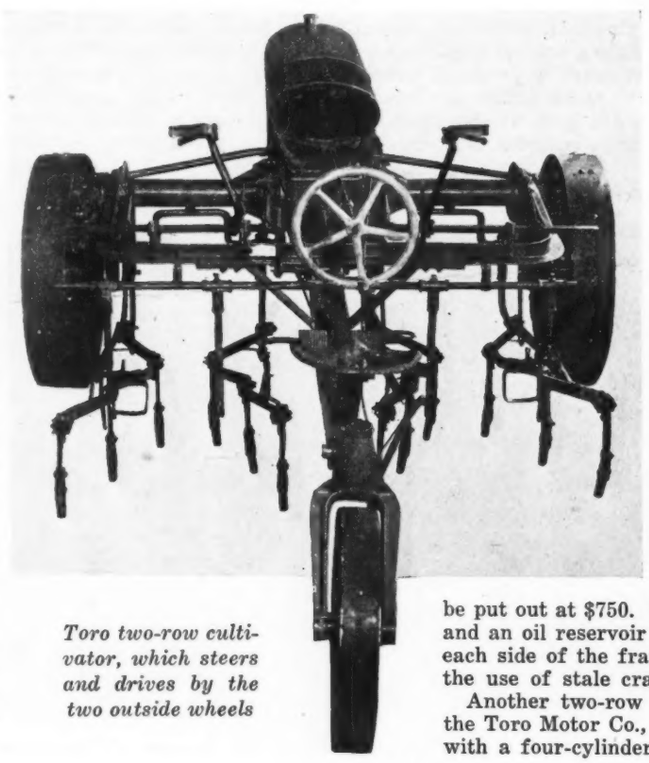
One of the first motor-propelled cultivators in the field was the Avery, manufactured by the Avery Co., Peoria, Ill. This is a 3-wheeled construction, with a single central steering wheel in front and two driving wheels at the rear. A structural-steel frame carries the engine, transmission and differential shaft, from which latter the drive is by bull gears to the driving wheels. The power plant is the same as that used on the 5-10 horsepower Avery tractor, comprising a four-cylinder block engine of 3 in. bore and 4 in. stroke, and a three-speed sliding gear transmission, giving a speed range of 1 to 3 m.p.h.

The machine is 84 in. wide over the driving wheels. The steering mechanism for the front wheel is controlled by means of a handwheel through a shaft extending along the top of the engine bonnet. It consists of a pair of bevel and a pair of spur gears. In addition to steering by the single front wheel, provisions are made for using the driving wheels for steering. A brake of the band type is located on each of the differential shafts, each brake being operated by means of a separate lever, and by applying the brake to one shaft (thus locking one of the driving wheels) and applying power to the other driving wheel, the cultivator can be made to turn around one of its driving wheels as a pivot.

Gasoline Recommended as Fuel

Gasoline is the fuel recommended, and a supply of 9 gal. can be carried in the tank on the engine. The driving wheels measure 42 by 6 in. and the steering wheel measures 28 by 5 in. The width between the center of drive wheels is 93 in., when built for 40-44 in. rows, but the machine is also furnished for special widths of rows. The clearance under the frame is 30 in.

This machine weighs 2800 lb. and is capable of taking care of 100 acres of crops in a season, which is said to be about twice as much as can be attended to with one team of horses. There is a seat for the operator on the bar extending back from the frame, the operator's feet resting on the lever for controlling the lateral motion of the cultivator gang. Directly in front of the operator are levers for applying the brakes to one or the other side of the differential, for changing gear, withdrawing the clutch and for lifting the cultivator gangs. With this cultivator the Avery company furnishes as extras a weeder attachment, a lister attachment, a check row attachment and a belt attachment. The price is $650 for the four-cylinder machine as described. A six-cylinder machine of the same cylinder dimensions will also be put out at $750. The bull gear drive is exposed, and an oil reservoir for lubricating it is located on each side of the frame. The company recommends the use of stale crankcase oil in these oilers.



Toro two-row cultivator, which steers and drives by the two outside wheels

Another two-row cultivator is manufactured by the Toro Motor Co., Minneapolis. This is equipped with a four-cylinder 3⅛ by 4½ in. engine, a dry-

Double-row cultivator attached to new Allis-Chalmers light tractor

disk clutch and a two-speed transmission of the heavy duty type. The cultivator is of three-wheel construction, the third wheel being located centrally at the rear. Steering is effected either by turning the driving wheel around the pivot support or applying a brake to one or the other of the differential shafts. The engine is fitted with a governor, and the gearing is such as to give theoretical speeds of 2 or 3 m.p.h., but owing to ground slippage the actual speeds are 1¾ and 2¾ m.p.h.

This machine has an overall width of 80 in. The cultivator gangs are controlled by one lever for each set, and there is also a lateral control by means of a pedal. Drive axle housings of 5 in. piping are secured to each side of the transmission housing, and to the ends of these 5 in. pipes are secured the steering heads. To the differential shaft housings is also secured an angle iron frame to which the different control members are attached. The front wheels measure 36 by 7 in. and the rear wheel measures 24 by 4 in. The drive to the front wheels is by means of an internal gear almost the full diameter of the drive wheel. A universal joint is inserted in each driving shaft, the center of which is in line with the steering pivot axis. While gasoline is to be used as the fuel at the start, it is the intention later to furnish kerosene burning equipment. The clearance is about 36 in.

Bailor's Two Types

Both a single row and a two row cultivator are exhibited by the Bailor Plow Mfg. Co., Atchison, Kan. The single-row cultivator is intended specially for cotton cultivation in the South. This is a four-wheel construction, the front wheels being mounted on a yoked axle to obtain the necessary clearance at the center of the machine. The cultivator is steered by swinging the front axle around its center support.

This machine is equipped with an 8 hp. Cushman two-cylinder, two-stroke engine, Kingston carbureter, Dixie magneto, air cleaner, Borg & Beck 10-in. clutch, a sliding gear transmission affording two forward and one reverse speeds, and chain drive to the rear wheels. The machine has an angle iron frame to which are secured the cranked rear axle and a bracket to which the cultivator gangs are attached. The cultivator is very much the same as made by Bailor for horse work. It can be equipped with either two or three shovel gangs. The weight of the machine is 1100 lb.

The two-row Bailor cultivator is fitted with a four-cylinder Leroi engine, Holley or Kingston carbureter, Borg & Beck 10-in. clutch, Dixie magneto, sliding gear transmission and chain drive from the differential shaft to a counter shaft and thence to the rear driving wheels. This machine is of the three-wheel type, having a single front wheel mounted in a caster yoke. Steering can be effected either by turning the single front wheel or by applying a brake to one or the other of the jackshafts. The frame is adjustable for different widths of rows. This machine weighs about 2000 lb. While each set of cultivator gangs can be lifted by a single lever there are two small levers adjacent to each of the aforementioned levers for controlling the relative height of each shoe.

Moline Universal

Among the lighter tractors designed to handle cultivators in addition to plows and other implements is the Moline Universal. The Moline Plow Co. manufactures a special two-row cultivator, which can be hitched to the draw-bar of this tractor. The seat is on the cultivator and the steering wheel, engine control handles, clutch and gear levers are within easy reach of the operator. A special feature of the Moline construction is that the operator does not sit in line with the center of the tractor but to one side in line with the right hand bull wheel. This gives him a clear view of the row directly ahead. This off-set hitch feature, as it is called, enables the driver to steer the tractor very closely, the design being such that the inside wheel of the tractor must be kept a certain distance from the outside row. For dodging individual hills the cultivator gangs are shifted by the operator's feet. Use is made of a so-called pendulum gang shift. The gangs are suspended at three points and are shifted by pedals. When the foot pressure is released the gangs automatically return to the center. When the corn is accurately planted and the tractor is driven straight, only very little shifting is required. Only one lever is used for raising the gangs, which are automatically leveled when raised regardless of their individual adjustment for depth. This adjustment for depth is made by a double acting hand screw. Strong springs are provided to assist in raising the gangs. The gangs are held to their work by pressure rods with compression springs. The gangs may be adjusted laterally for cultivating rows of from 40 to 46 in. The wheels of the cultivator are 40 in. in diameter with 4 in. concave tires and have dust-proof hubs and large hard oil compression grease cups.

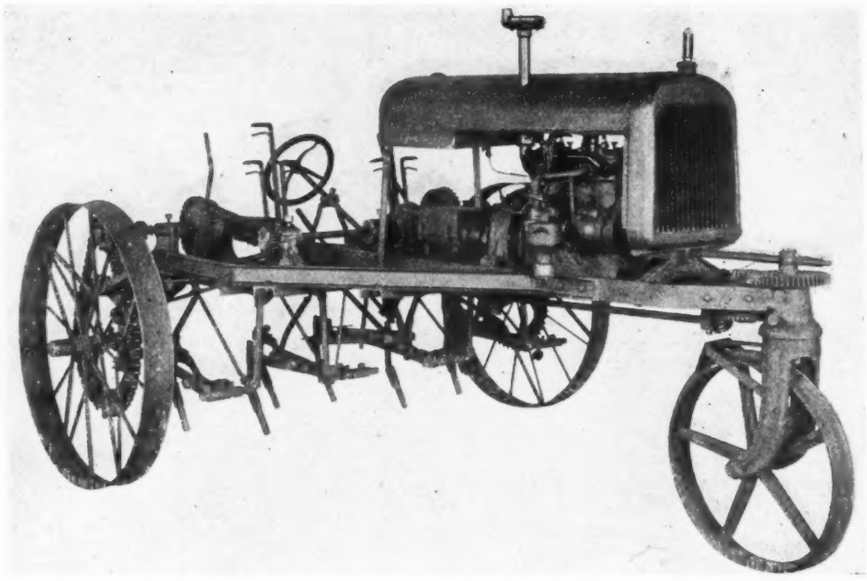
The Moline tractor weighs 3360 lb. and the cultivator 924 lb. The electric governor of the Moline, by means of which the engine speed can be varied within wide limits, is a specially valuable feature in corn cultivating. The governor adjustment is located immediately in front of the driver, and the operating speed can be instantly varied. For the first cultivation a speed of ½ to 1 m.p.h. is recommended; for the second, 2 to 2½ m.p.h., and for the third, 3 m.p.h.

The light tractor recently brought out by the Allis-Chalmers Co., Milwaukee, is also adapted for cultivator work. This

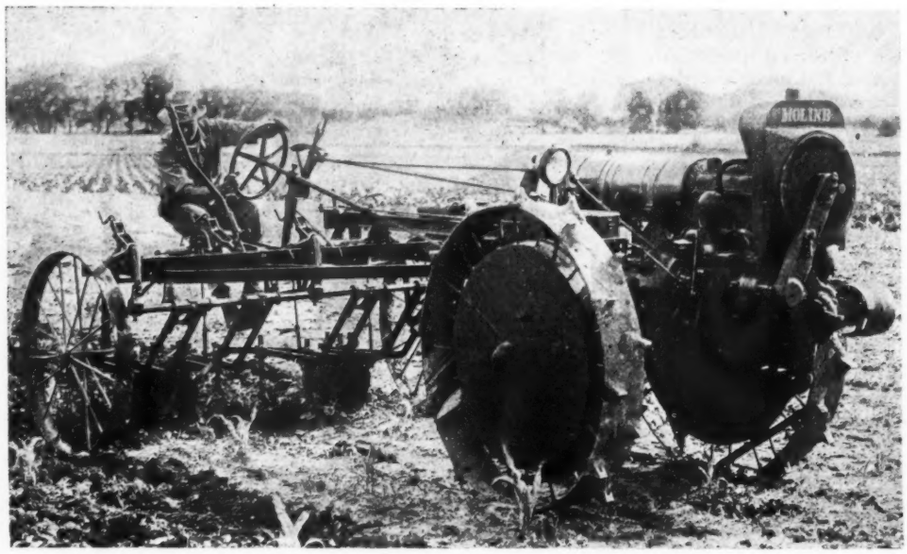
machine is rated at 6 hp. on the drawbar and weighs 1850 lb. It has a ground clearance of 28 in. and can be turned in a 16 in. circle.

Indiana Tractor

Another small two-wheeled tractor adapted for cultivator work is marketed by the Indiana Silo Co. of Anderson, Ind. It weighs 1700 lb. and is claimed to be capable of cultivating 20 acres a day with a two-row cultivator. The hitch of this tractor is so designed that almost any implement can be attached by means of two bolts which make a rigid hitch. Thus the tractor and the implement become a single unit, allowing the operator to control both, the same as he does with horses. This tractor is equipped with a four-cylinder engine of 3⅛-in. bore and 4½-in. stroke. Four different speeds may be obtained by changing driving sprockets. The final drive is by chains and steering is by rack and pinion. The usual change gear is omitted, and no change of speed, or, rather, of gear ratio, can be made from the seat. This, of course, helps to reduce the weight of the tractor.



Bailor two-row cultivator, steering both by the single front wheel and by the two rear wheels



The Moline is the only one of the larger tractors having sufficient clearance to permit of its use for cultivating

No Special Implement Needed

While it is recommended by the manufacturers of this tractor that the farmer should purchase a plow specially designed for it, most of the other stiff-tongued farm implements are available for use with the tractor. The clearance is the same as that of the standard corn cultivator and the claim is made by the manufacturers that less corn will be knocked down than with horses. Another point made is that frequent cultivation increases the growth and yield of corn and, as the tractor does the work in shorter time and therefore permits of this, it should lead to increased crops.

Dry Cell and Storage Battery Work of the Bureau of Standards

G. W. VINAL of the Bureau of Standards has been engaged in some work on dry cells and also has drawn up specifications for storage batteries for industrial trucks and tractors, the latter for the use of the Army. As a result of the work, a bulletin will shortly be issued by the Bureau of Standards which will contain a general discussion of the working principles of dry cells, enumerate the different types in use, give a list of standard sizes in which the cells are made and propose standard methods of tests. There are two ranges of sizes of dry cells, the small ones being used almost exclusively for pocket flashlights. Of the three larger sizes, the intermediate one, the 2½ by 6 in., is much used for ignition work. The two other large sizes are 1½ by 4 and 3½ by 8 in.

The forthcoming circular, No. 79, on dry cells will contain specifications for tests, including a continuous discharge test through a fixed resistance and an intermittent discharge test. It is of interest to know that although the use of dry cells for automobile ignition has been almost entirely abandoned, still 71,000,000 dry cells of the larger sizes were manufactured in 1914, and the production is said to have increased considerably since that time. The recent large increase in the price of dry cells is chiefly due to the scarcity of black oxide of manganese which is used as a depolarizer. Previous to the war this material was obtained from Russia, which source of supply has now been entirely cut off. At the present time we obtain our supplies of this chemical from South America, Japan and Cuba, and some is also mined in the United States.

The storage battery work done by this section has been entirely for departments of the Government and has been of a confidential nature, so that no results can be given out. This work has been in progress for more than a year. In 1914 the weight of storage battery plates produced in this country was 41,000,000 lb.

Tractor Problems That Are Awaiting Solution

Kansas City Show Suggests Need for Lighter Weights—Improvements in Transmissions—Better Dust Preventives—Parts Makers Are Important Factor

By David Beecroft

KANSAS CITY, MO., March 10—No greater deduction could be carried away from the tractor show here than that those national parts makers who have been such cornerstones in the automobile and truck industries are rapidly taking similar positions in the tractor industry and that the history of the tractor industry will be inseparably connected with them.

It was these makers in tens, fifties and hundreds at the show that gave it such an international significance. The products of these makers are known in the four corners of the world and no matter what kind of products they are they will help to merchandise such a product. There is great value in a reliable, well-known part in any vehicle.

So often is the story of improvements in a tractor largely the story of what these stalwarts in the manufacturing world have done in the past year. You ask in what way a tractor has been improved and the maker points with pride to an improved engine that has been purchased outside; or to anti-friction bearings in the wheels; or to an improved magneto with impulse starter; or to better and lighter wheels which have come from the parts maker; or he draws your attention to an improved radiator, an improved governor, an improved frame or an improved axle.

Parts Makers' Names Help Sales

The use of many of these parts which have been more or less standardized for international sale will make the export trade of tractors easier than it would otherwise be. If our tractors are fitted with anti-friction bearings which are interchangeable with French, British, Italian and German bearings then the maintenance of these tractors in foreign fields is correspondingly easier. It is going to be easier to sell a tractor in Australia that is so fitted. The same is true with regard to practically every other country. Such a design makes it easier for the dealer. He can secure stocks more easily. He has not so much money tied up in stocks of spares. He has a more fluid maintenance system.

Tractors must be furnished for nearly every nation. The American tractor maker has had a good export trade for several years. It dates from the huge traction engine types that got us into trouble in several countries because of the lack of competent repairmen to keep them operating. The maker must have foreign trade in view when designing his tractor.

It is putting the cart before the horse in export trade to design a tractor for home conditions and after it is completed think of selling it in the export field as well. Ninety per cent of the tractor may be suitable for foreign trade, but there may be some little parts that are going to be trouble makers. Have the foreign trade thought constantly in mind. The world will need tractors and if we do not do our part in furnishing them then we are leaving the field to some one else and in short asking those people to build up huge organizations while we let the markets slip through our fingers. We have some ships and we are going to have more and we must produce products for them to carry to all lands in order that we can be assured of getting from those lands what we need in raw materials for our industries and national life.

Foreign countries are taking up questions of tractor design in earnest. They will have their tractors for sale in the world's markets. They may set a standard of excellence that we will have to reach up to. They may establish the fact that the cheapest tractor is not always the lowest-priced one. The foreign maker's standards must be heeded.

The aim for lighter parts has taken hold in many factories. It has been demonstrated for 3 years that weight is not a first essential to tractive effort. Tractors have been in existence for some time in which the drawbar pull is in excess of the weight of the machine. With this a demonstrated fact it scarcely seems necessary to have tractors in which the weight is more than twice the drawbar pull. In such engine power is being used to transport a weight that could be eliminated.

Further chapters in weight reduction will be written when the use of stampings becomes more general. Some of the big pressed steel firms have not yet started making tractor stampings.

The use of stampings in creeper types has not even begun. It has been under consideration. There is a need for it and yet the work has been delayed. The heavy weight of the creeper tread is generally commented upon. Some makers admit a 50 per cent increase in weight of a creeper as compared with a wheeled type and yet the final step in creeper progress has not been started.

Problem of Power Application Difficult

The complete problem of engine power in relation to work to be done is not yet solved by all. Sometimes the power of the engine is not efficiently transmitted to the wheels. There are cases where the wheel diameter has not been carefully calculated with regard to engine power. Wheels are in some cases too large and in others too small in diameter. More engineering is needed.

There is yet a lack of uniformity and there may not be much uniformity for some years in power transmission. The problem is so much greater than in the automobile or truck due to greater gear reductions that there are bound to be differences of solution.

One maker uses the worm as a final reduction, whereas another uses the worm in his intermediate reductions where he can have a high worm speed. The same maker uses spur reductions in the final stages where speeds are low. The best place for the worm is a subject of discussion.

The use of very large transmission gears common a few years ago is fast disappearing. The cast gear of large diameter and great weight is being replaced by gears that are little larger than those used in trucks. There is much yet to be done. The making of gears must be carried to greater lengths in tractors than in cars and trucks. The development of a stout tooth for heavy tractor service has to be carried on. A few makers have for a three-plow tractor a gearset very little larger than in motor trucks. These gearsets are remarkable in comparison with the huge gears of other makers.

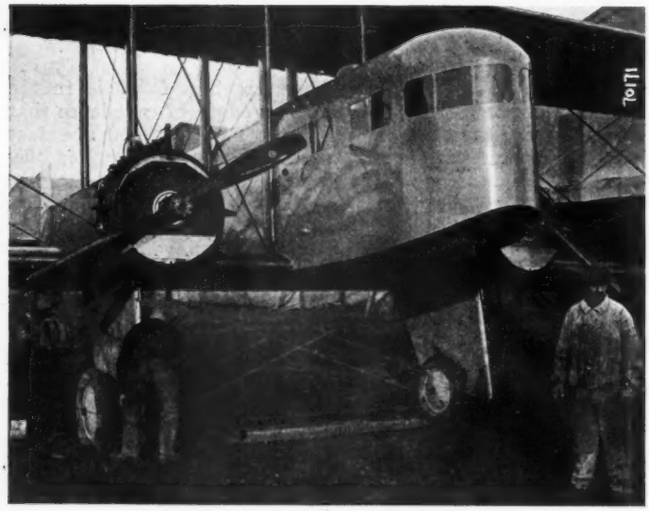
In some gearsets too many gear reductions or stepdowns are used. There are cases of five different stepdowns. This means too great a multiplication of gears. It means too heavy a gearbox. It means added bearing cost. What some do in five stepdowns others are doing in three and some in

(*Continued on page* 601)

Ambitious Flights Planned Abroad

Caudron and Farman Rivals in London-Paris Flights—Vedrines Planning World-Round Flight —Farman Bomber for Daily London Route

By W. F. Bradley
AUTOMOTIVE INDUSTRIES' *European Correspondent*



Closed cabin and one of the Salmson 9-cylinder star engines used on Farman passenger-carrying airplane

PARIS, Feb. 15—Two French firms, Caudron and Farman, are anxious to establish a regular aerial service between Paris and London. The machines are ready and have undergone their trial flights very satisfactorily, but neither can leave owing to the refusal of the British Government to give permits for civilian passengers to be carried; in consequence, the Farman machine will probably leave in a few days with a military pilot and military passengers. This, however, does not satisfy Henri Farman, whose desire is to establish a regular aerial route between Paris and London.

The Farman machine was originally designed as a big bomber; it has a wing spread of 92 ft. and a total area of 1775 sq. ft. It is equipped with two Salmson Star engines having a total power of 540 hp.; it carries a useful load of 6600 lb. and has a total weight of 11,000 lb.

Its horizontal speed is practically 100 m.p.h. and its landing speed only 37 m.p.h. It will climb to 1600 ft. in 4 min., 3200 ft. in 10 min. 30 sec., 5000 ft. in 17 min., and 6500 ft. in 25 min. The gasoline and oil consumption of the two engines is 104 lb. per hour. As the distance of 200 miles which separates Paris from London can be covered in practically two hours, the weight of fuel and oil consumption on the trip will be about 210 lb. for each journey.

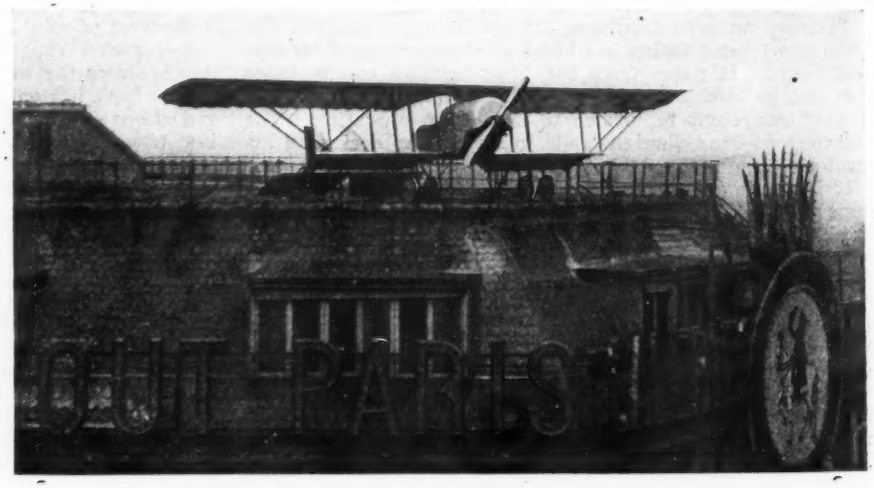
Making allowance for the weight of wireless apparatus and other internal fittings, the machine has a capacity for 30 passengers. Farman has fixed the cost of the round trip by air at $80. It is intended to make the journey from Paris to London via Lille and Boulogne-sur-Mer. A stop would be made at these two intermediate towns whenever necessary, but, of course, no stop will be made when passengers have been booked right through.

The second machine which is waiting to start the Paris-London service is a Caudron biplane type 23. This machine has a useful load capacity of 2600 lb.; thus it will carry 12 passengers on its trip from Paris to London.

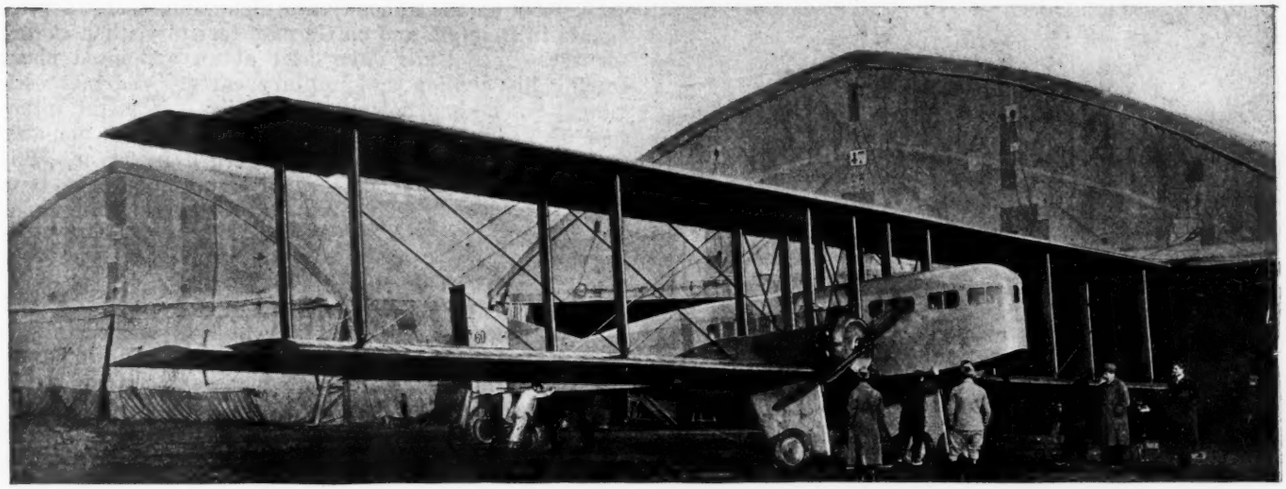
Verdrines' Exploit Nets Him $15,000

The machine with which Jules Vedrines landed on the roof of the La Fayette dry goods store last Sunday is a Caudron biplane type G3, equipped with a Gnome rotary engine. The available landing space was only 66 ft. long by 23 ft. wide. A considerable time before the war the owners of this building offered a prize of $5,000 to any aviator who would land on the roof and get away again. This offer was looked upon as a little cheap publicity, for it was never imagined that any attempt would be made to win the prize. For several days before making the attempt Vedrines had practised landing within a circle having a radius of 65 ft., and had been able to accomplish this successfully every time. The machine, which is a tractor type, is exceedingly flexible, planes well, and lands easily; it has been made use of during the war for training air pilots. Vedrines made his successful landing on this roof on Sunday morning, in the presence of very few people. By this exploit he has gained $15,000, for in addition to the $5,000 offered he had taken bets to three times this amount.

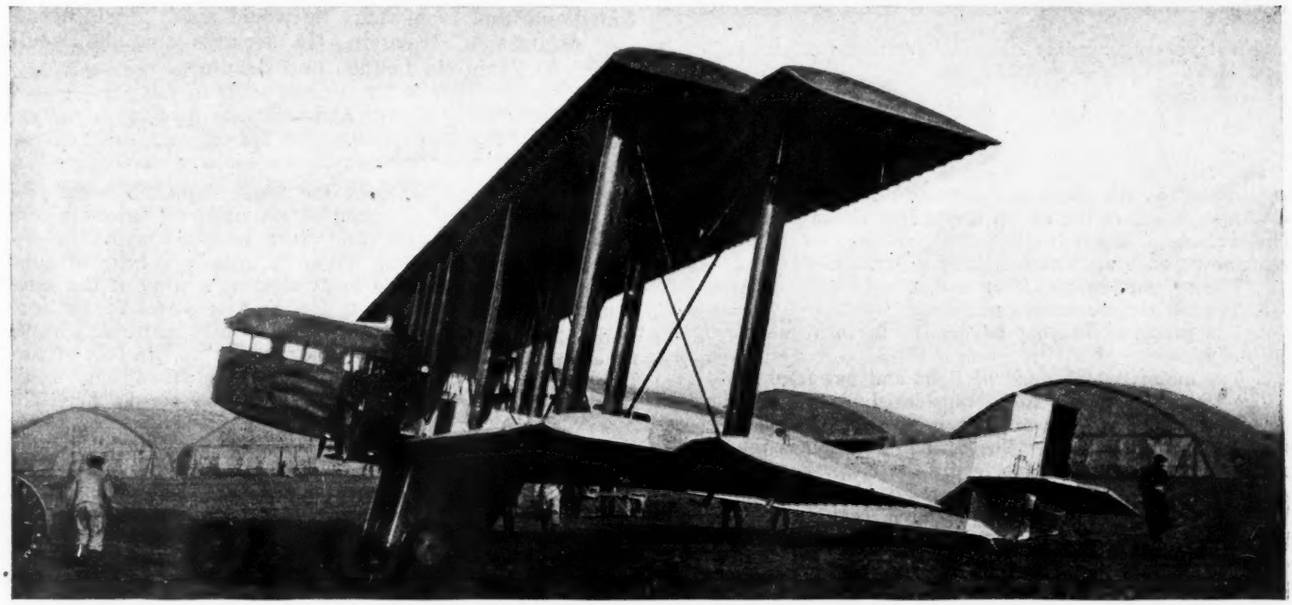
During the war Vedrines has been employed almost



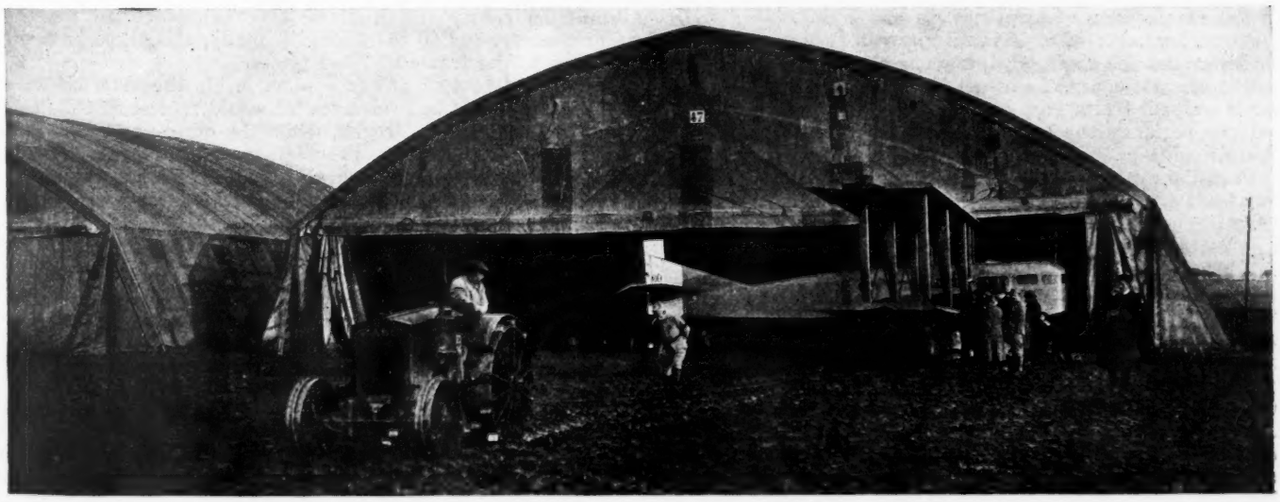
Vedrines' biplane on the roof of the La Fayette dry goods store



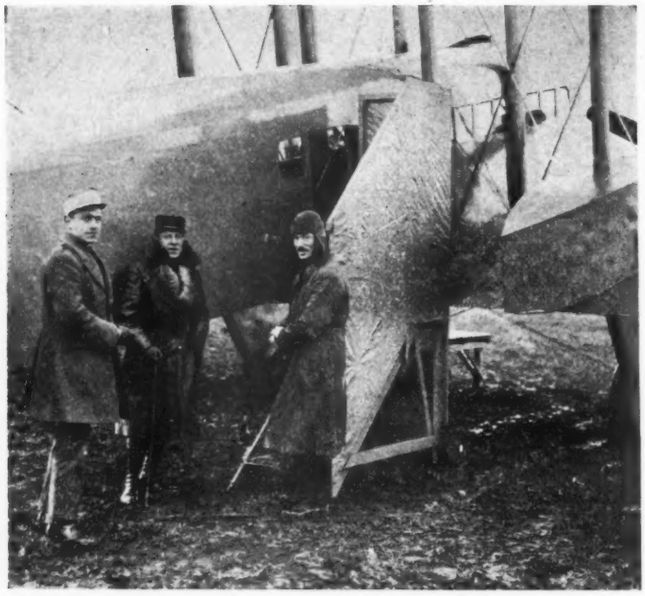
Farman biplane built to undertake regular passenger service between Paris and London



Big Farman biplane which will undertake a regular service between Paris and London with 20 passengers aboard



Farman biplane being hauled out of its shed by a Case agricultural tractor



First passenger going aboard Farman's Goliath, built for Paris-London service

exclusively on the difficult task of landing secret service agents in Belgium and on German territory, then calling for these men some days later at an appointed place. During his civilian and military career, Vedrines estimates that he had flown 310,000 miles. It is the intention of Vedrines, at an early date, to make a non-stop flight from Paris to Rome and return in 24 hr. For this trip he would make use of Caudron biplane type C-23, a start being made from Paris at night time under a full moon.

Will Fly Around World

Later, Vedrines declares that he will make a flight around the world. Starting from Paris, he would fly over Spain, into Africa and Madagascar; from there he would proceed to Asia by way of Persia, British India, and then to Siam, China, and Japan. He states that he will fly to America via Behring Straits. He would fly right down the Pacific coast line from North America to South America; he will visit Brazil, Guiana, Venezuela; then to St. Louis, Washington and New York; from the United States he intends to fly into Canada and Newfoundland, and from there he would make a trip across the Atlantic to Ireland. He declares that he would return to Paris via London and Brussels.

Development of Air Traffic

A PAPER on the above subject was read recently by A. P. Kapteyn before the Dutch Royal Institution of Engineers. The author points out that the performance of a flying machine depends upon four principal factors:

1. The supporting planes or wings.
2. The car for the crew and engine.
3. The propeller which produces the forward movement of the machine.
4. The motor, which must be light and powerful.

The two chief points to be considered in connection with the design of the wings are lifting power and resistance to passage through the air. The former determines the carrying capacity of the machine, while the latter has an important bearing on the motive power required.

A large number of experiments have been carried out by Mr. Eiffel and other investigators, in which models of wings were placed in a large tube through which air is propelled at a high velocity.

The lecturer is of opinion that the soaring of birds, which apparently takes place without any expenditure of force, depends on some natural phenomenon at present unknown, which, if discovered, would lead to important developments in the construction of airplanes.

A large number of experiments have also been carried out to determine the most advantageous shape of car and propeller. A stationary car model is placed in a tube by which air is propelled at a high velocity, while a special measuring balance registers the resistance they offer to the passage of the air.

Propellers driven by electric motors are similarly tested in quiescent air. These experiments are carried out under ordinary atmospheric pressures as well as in rarefied air, so as to ascertain the decreased resistance in the upper layers of the atmosphere.

The Dutch Government has decided to build a similar laboratory in Amsterdam so that the Dutch manufacturers may have all the necessary information on this important subject at first hand.

The lecturer describes the ordinary maneuvers possible with spherical balloons, the decrease in lifting power in the upper layers of the atmosphere and the usual means for regulating the altitude of flight, such as allowing gas to escape, throwing out ballast or pumping air into the balloon. He next describes the dirigible airship, and shows that the first airships made by Giffard, Hänlein and others were only about 165 ft. long, whereas the latest Zeppelins were over 400 ft. long. They consisted of a number of separate cells in an aluminum frame, and were provided with 1500-hp. engines capable of flying 55 to 62 miles per hour in quiet weather, but were unable to fly against a wind of the same velocity. It is not possible to get the fabric used for balloons quite hydrogen gas-tight, as even the best material permits 0.039 to 0.056 cu. ft. of gas to escape per square foot of surface per 24 hr. A Zeppelin of 1,800,000 cu. ft. capacity would therefore lose some 27,000 cu. ft. of gas per 24 hr. The escaped hydrogen gas is retained in the outer envelope, where it mixes with air and forms an explosive gas that has caused a number of accidents. This, together with the great weight of the aluminum framework, limits their sphere of action. If the danger of explosions could be eliminated and the weight of the frame reduced, a really useful airship might be built.

Mr. Boerner proposes to build dirigible airships of great size and recommends a length of 700 to 1000 ft., the frame to consist of three deep aluminum girders with short pointed pieces. The cabins, motors and propellers would be suspended between the girders. The cells containing hydrogen would be nearly rectangular, three being jointed together transversely, and 20 to 30 longitudinally, and all to be firmly secured to the frame and end pieces.

One-third portion of the volume inside the external cover which is to be of balloon material would consist of cells completely filled with hydrogen, while the other spaces could be partly filled in order to provide expansion for the external pressure varying according to altitude. To prevent explosions, the space between the cells and the outer cover is filled with hydrogen.

The ship would be driven by thirty-four 200-hp. motors arranged in two rows, each motor to drive its own propeller, adjustable for driving in any required direction, viz., upward, downward, forward or backward. The ship can thus be completely controlled by the engines. It is proposed to balance the ship automatically both longitudinally and transversely by pumping gas from one end to the other.

The author suggests that the airship should, on arrival at its destination, "land" in water and that passengers should step out on a pier as from a steamer. Re-starting from the water should be effected by the motors for vertical movement. He does not anticipate any difficulties either in building or maneuvering such an airship.

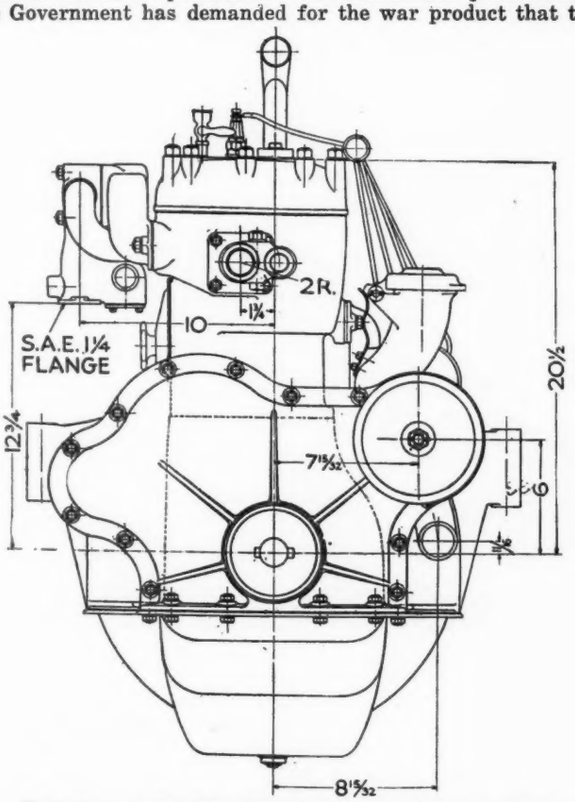
Three Hinkley Engines Built Around Class "B" Design

Models Suitable for 4 to 6-Ton. 3 to 4-Ton, 1½ to 2½-Ton Trucks and Tractors Drawing 1 to 4 Plows

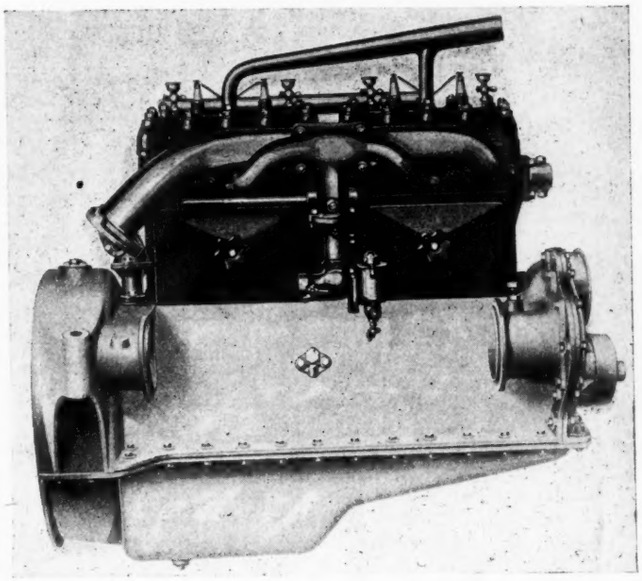
THE Hinkley Motors Corp., Detroit, is now entering commercial production with a line of truck and tractor engines, built around the standards of design and workmanship utilized in the manufacture of the Class B Government engine. Having, through its experience with the military truck engine, reached the conclusion that this design represents the best in construction for heavy-duty automotive purposes, the Hinkley corporation will manufacture this same type of engine under the name Hinkley-Class B. In addition, the models HA and HAA are built along the same lines and show the same characteristics with reference to appearance and performance.

This gives a line of three engines, all of similar characteristics, rated at 55 hp. at 1400 r.p.m. for the Hinkley-Class B, 45 hp. at 1500 r.p.m. for the HA, and 35 hp. at 2000 r.p.m. for the HAA. These engines are respectively suitable for 4 to 6-ton, 3 to 4-ton, and 1½ to 2½-ton commercial vehicles, or 4-plow, 2 to 3-plow, and 1 to 2-plow farm tractors.

In following the high standards of design and workmanship laid down by government specifications on the Class B military engine the Hinkley corporation has taken a step which has been predicted as a result of the war experiences. In designing this engine for the Government, the matter of price did not enter as a primary consideration, but the performance and life were made the prime factors. It is around the idea that the motor truck business in this country would demand the same qualities for the commercial product that the Government has demanded for the war product that the Hinkley Motors Corp. has shaped its policy in producing this line of engines.



End view of Hinkley Model HA, showing mounting, dimensions and timing gear case



Right-side view of Hinkley Model HAA

The Class B military engine has been described frequently and is familiar to truck engineers. The Hinkley-Class B is similar in practically all respects to the Government design, the only changes being in manufacturing detail. The Class B is 4¾ by 6 in. with cylinders block cast. The turning effort of the engine is 3000 in. lb. at 1000 r.p.m. and the weight is 1040 lb., less carbureter and magneto. In all essential details the military design is carried out.

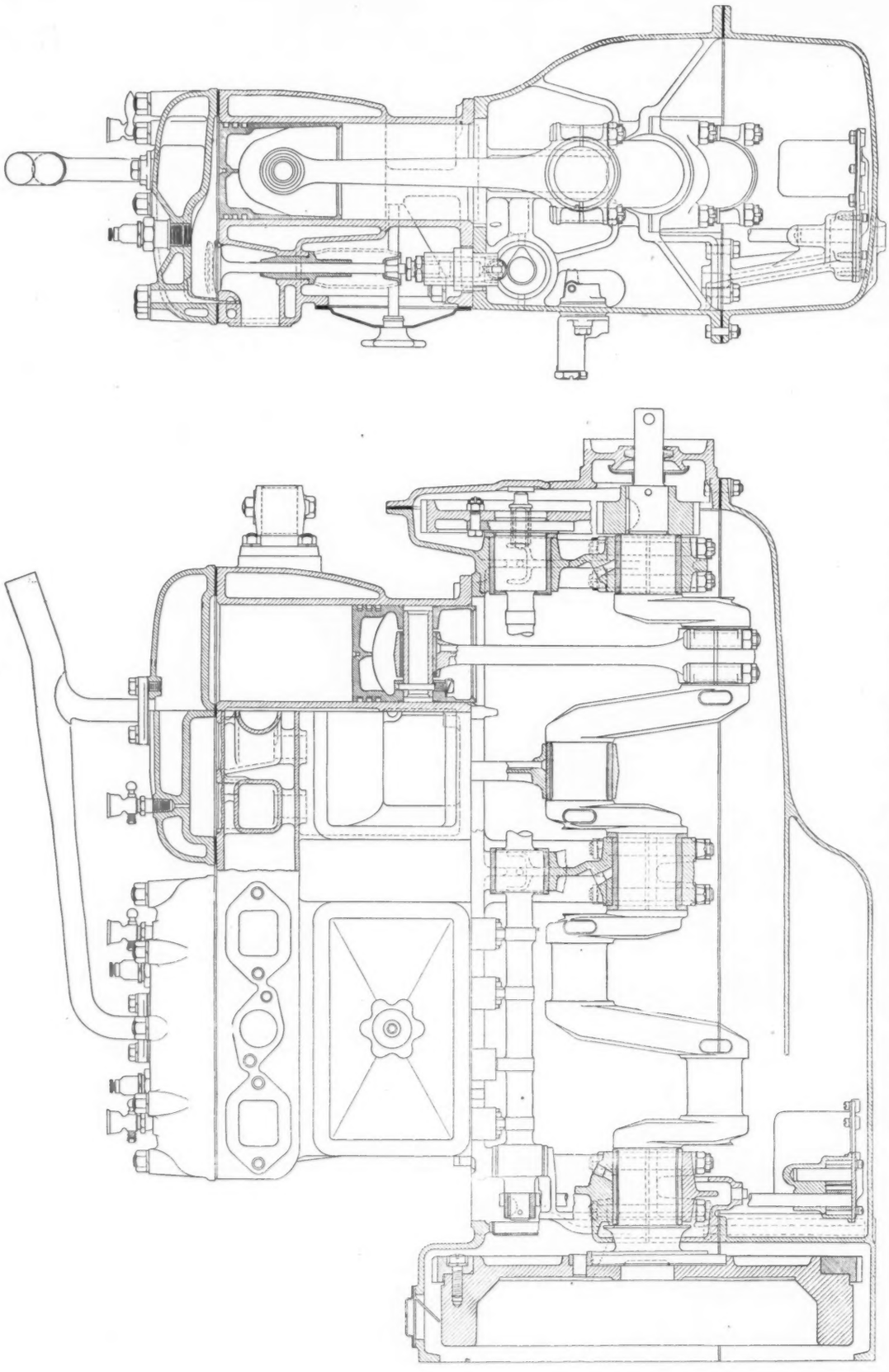
The Model HA is 4½ by 5½ in. and is otherwise identical, with the same rigid inspection safeguards as its predecessor, the Class B. The Model HAA is 3¾ by 5¼ in. and is also adapted for 4-in. bore cylinders, for the purpose of utilizing it in connection with maximum 2½-ton truck sizes, enabling truck manufacturers to standardize on one engine that will take care of trucks ranging from 1½ to 2½ tons.

The general description and specifications of these three engines are similar. The block cylinder castings have two detachable heads and are mounted on a cast-iron crankcase with a removable pressed-steel pan. The cylinders are L-head, all the valves being enclosed. All the engines have three-point suspension, the rear mountings being on the flywheel housing and the front mounting is a large-sized trunnion on the gearcase cover.

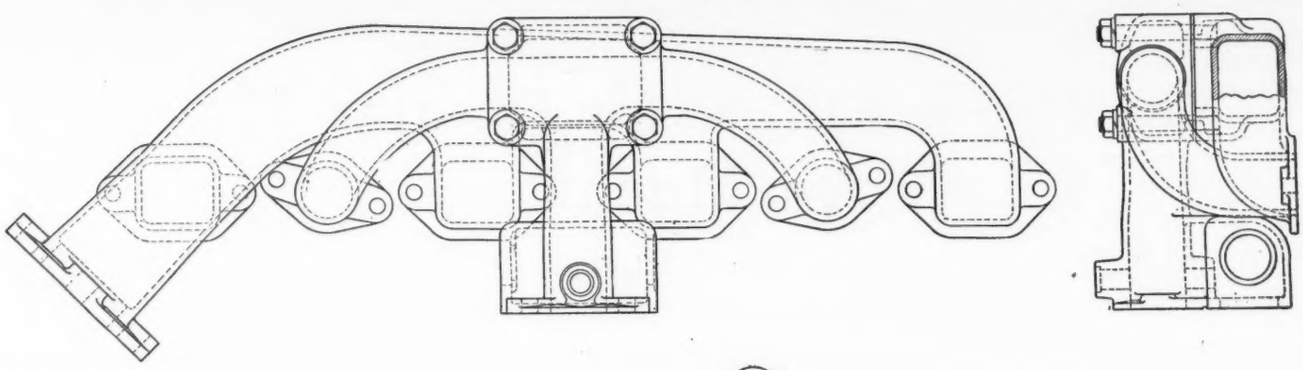
The piston displacements for the Model HA is 350 cu. in., and on the HAA, 232 cu. in. for the 3¾-in. bore and 264 cu. in. for the 4-in. bore. The valve diameters are 2 in. on the HA and 1¾ in. on the HAA. All the engines have the valves on the right side, with the manifolds on the same side as the valves. The general characteristics of the engine are such that they all show better than 0.6 lb. of gasoline per brake horsepower hour under maximum load conditions.

One of the characteristics of the Class B engine was its heavy crankshaft, and this same feature will be followed in the smaller models. On the Model HA the crankshaft is 2⅞

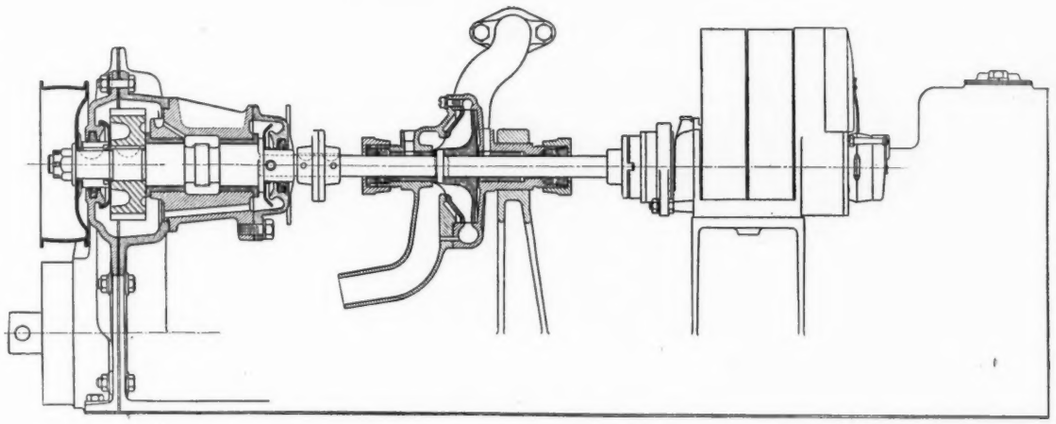
New Hinkley Engine for Truck and Tractor



This engine is built around the standards of design of the Class B government type and is especially adapted for heavy-duty purposes



Exhaust and carbureter manifold assembly on new Hinkley engines

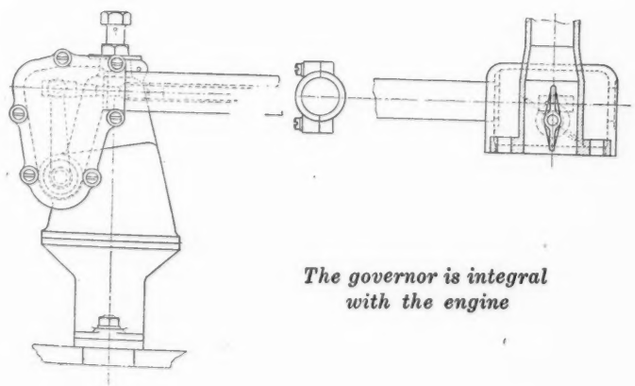


Water pump and magneto drive of Hinkley engine

in. in diameter at the main bearings and 2¼ in. in diameter at the connecting-rod bearings. The lengths of the main bearings on this model are: Front, 2½ in.; center, 3½ in.; rear, 3½ in. On the HAA engine the crankshaft is 2¼ in. in diameter at the main bearings and 2⅛ in. in diameter at the connecting-rod bearings. The main bearing lengths are: Front, 2¼ in.; center, 3 in.; rear, 3 in.

The camshafts are carried on three large collar bearings through which the camshaft may be withdrawn, leaving the bearings integral with the case. The cams are designed for the roller type of lifter and these are made of large size, as shown in the sectional illustration, to withstand wear. The large valve stems and heavy spring characteristics of the Class B military engine are followed on these two smaller models, and the same locking systems on the valve stems are utilized.

The connecting-rods on the Model HA are 12 in. in length; on the HAA they are 11½ in. long, and all are of the four-bolt construction, having alloy steel bolts to hold the caps in place. The rod is designed with the web in the center, and the upper rod bearings on the small engine are 1⅛ in. in diameter by 1¾ in. long, and on the larger engine 1¼ in. in diameter and 1⅞ in. long. Both engines are equipped with five-gear trains in front and have the camshaft gear bolted to the camshaft flange with four alloy steel bolts. The idler gear runs in a double, babbitt-lined bronze shell bearing. Provision is made on the engine for lighting generator and starting motor, the make being optional.



The governor is integral with the engine

Pump water circulation is used, a centrifugal pump with one connection to the cylinder being employed. The water outlet header has two connections of tubular construction, to secure the proper water distribution to each cylinder group. To assist in vaporizing the fuel the engines have the hot-spot manifold design, assisting in completing vaporization and helping to minimize crankcase dilution. Another feature of the construction is the surplus of metal around the head bolts, preventing possibility of unequal pressure on the head gasket when tightening the bolts.

A full force-feed lubricating system is employed with the oil pump submerged in the oil pan, the latter being integral with the crankcase so that the crankcase can be dropped without disturbing the pump. The oiling system is so arranged that the lubricant feeds through a complete copper tubing system, clipped to the inside of the crankcase and carrying the maximum oil pressure to all the needed points. To maintain constant pressure, there is an automatic regulating relief valve. The oil gage is on the side of the crankcase and is of the conventional bayonet blade type.

Throughout the construction, sections are generous wherever there is any unusual stress. This is particularly noticeable in the pistons, which are extra heavy in section to enable the heat to be rapidly carried to the jacket wall with the greatest amount of speed to insure cool heads. Another provision for safety is in the extra large anchorage plate on the front of the cylinder block to take care of any standard make of fan. The plate is bolted to a square pad on the cylinder block in such a way that there is more than enough metal to prevent the breaking of water jackets.

There has been no departure from conservative practice throughout the engine, but, as in the case of the Class B military truck engine, the best-known principles of design have been employed without any shaving of specifications to cut production costs. The Hinkley Motors Corp. is in a position to deliver immediately the military Class B truck engine type, and within a short time will be in a similar position on the HA and HAA models.

See Great Future for Lighter-Than-Air Machines

Their Use Soon for Aerial Traffic Discussed by Engineers at S. A. E. Aeronautical Session—Planes Should Land in and Leave Small Spaces

OF all speculations as to the future of aerial traffic nothing seems as certain as that lighter-than-air craft of very large size will be tried out as long distance passenger carriers within a short time. That airplanes of anything near the load capacity of these ships will be built in the near future seems extremely unlikely.

These views, held by many whose opinion is entitled to respect, were emphasized again in two interesting papers read at the S. A. E. meeting in New York March 5. C. H. Day, of the Standard Aircraft Co., discussed the future of the airplane, pointing out constructional changes which would be necessary to adapt the war-developed plane for commercial usage, and Ladislas d'Orcy in a following paper gave much information as to recent performance of airships, showing how their development in war has been little less than that of airplanes.

Day anticipates a very important change in airplane construction which will permit the motor power to be used in a variable direction so that lift can be obtained at a lower speed than that at which the machine will fly when the whole power of the propeller is applied horizontally, or nearly so.

He considers that the practical use of an airplane and its safety depend in large measure upon ability to alight upon, or to rise from, a small area. At the present time 45 m.p.h. is about the minimum landing speed of a fairly fast plane; it might be possible to devise braking systems which would permit a machine to be pulled up quickly after landing, but such would be of no assistance in getting off the ground, and there is not much point in enabling a machine to land in a smaller space than it can get off from.

Vary Application of Power

To vary the direction of application of power Day suggests two possibilities, one the use of a propeller which can be inclined variably to the center line of the plane, the other variable wing surfaces which could be changed at will either as to area or inclination.

He points out that these are mechanical problems which should not be impossible to overcome, and that short distance flying, especially near cities, will only be fully practical when the plane can land on a city lot or even on a roof. For mail service especially the necessity for landing and transferring the load a good many miles from its ultimate destination is a serious handicap.

Day considers it unlikely that practical airplanes with a capacity for more than twelve passengers are to be expected till the art is much further advanced, but he has a strong belief in the small machine once the landing difficulty is overcome.

He voiced an opinion shared by many engineers, namely, that to make flying commercial the machine as a whole, and especially the engine, would have to be less delicate. He suggested that the air-cooled engine, so far, had always been developed with an extreme of lightness, so that it would be much lighter than a water-cooled engine of corresponding power, and that it therefore seemed likely that much could be done with air cooling. An air-cooled engine weighing the same for its power as a water-cooled motor, plus its water, ought to be, he said, much stronger and more durable, while also being cheaper to manufacture.

Day also believes in the evolution of twin-engined planes, even for small sizes. For one thing a plane with twin engines can be manœuvered on the ground by the pilot without the help of a gang of men to set it facing the right way. Also it is safer, if so proportioned, that it can just fly with one motor alone.

He suggests that twin motors of as low a power as 60 hp. would be valuable for single-seated "sportsman" types. For large machines he considers twin motors advisable because of their safety and also because of two motors arranged in nacelles the fuselage can be much better arranged for passengers and also protected from much noise and all thrown oil.

The following quotations from the paper cover these leading ideas of the authors:

"The commercial airplane of the future will be used for sport and the carrying of mail, passengers and express. All of these things are now being accomplished successfully but in a limited manner, and to what extent the field of usefulness will be increased depends largely upon the ability of engineers to develop machines better suited to this purpose than those that at present exist.

Factors to Be Considered

"Of paramount importance are the questions of safety, low initial cost, low cost of upkeep and low cost per ton-mile. A great deal of attention has been given to devices to increase the stability of the airplane with an idea that this will greatly increase its safety. I do not believe that the development of such devices will greatly enhance the future of the airplane. The ease with which pilots have learned to fly existing training machines would certainly indicate that the stability of these airplanes is sufficient for present needs, and investigation will show that the majority of accidents have been due to either collisions in the air or bad landings, and not through any inability of the pilot to control the actions of the machine. The stability of these machines can be increased to almost any extent desired at very little sacrifice of efficiency. In fact, it is perfectly feasible for any aeronautical engineer to design a machine of any type with the surfaces proportioned and arranged so that the machine will be self-righting under all conditions; will not tail-spin unless forced into it, and will come out of a tail spin of its own accord. By fixing the rudder on such a machine, it will fly almost indefinitely with all controls released and in case of motor stoppage will assume a natural gliding angle and maintain that gliding angle until it reaches the ground. I might add that there are absolutely no mysteries connected with the design of a machine to accomplish these results, and while riding as a passenger in such a machine two years ago I personally saw all of these.

Must Land in Small Space

"To my mind, the most important development for the future will be that which will enable airplanes to land in extremely small fields, or literally, in a man's back yard, and this must be obtained at not too great a sacrifice of high speed. At the present time the load carried on an airplane which has sufficient reserve power for safe flying is about 20 lb. per hp., and a speed range of from 45 to 90 miles per hr. is now obtainable with this loading. It would, therefore, seem that the future airplane should be able to maintain a high speed of 90 miles per hr., speed being one of the main advantages of the airplane over other means of travel.

"Among the possible means for reducing landing speed without sacrificing the high speed is the development of more efficient airfoils, devices for increasing the camber of the airfoil in landing, increasing the surface of the main planes, and possibly the development of an angular propeller thrust or auxiliary propeller to reduce the load per square foot of surface. Landing gears having greater shock-absorbing qualities to allow of stalling into a field from a greater height than is now possible would also help greatly. Airfoils having a high lift at high angles with low resistance at low angles, and which still maintain a good lift-drift ratio at normal angles, greatly reduce landing speeds and usually allow of maximum climb at low speeds. It is very probable that the efficiency of the airfoil will be increased to such an extent that any increase of camber would be of little benefit.

"With relation to the use of angular propeller thrust or auxiliary propellers, it should be noted that with machines carrying 20 lb. per hp. not more than 50 per cent of the power is necessary for sustained flying at very nearly the airplane's lowest speed. It certainly would be highly advantageous if the 50 per cent excess horsepower available at this point could be utilized as a vertical component to reduce the loading per square foot and thus reduce the landing speed.

Cost Is Next to Safety

"Of next importance to safety is cost. There is no doubt in my mind that the future airplane can be greatly simplified and thus greatly reduced in initial cost, and at the same time be made sufficiently durable so that the cost of upkeep will be a little more than that of an automobile. Most airplanes at the present time, whether they are manufactured in small or large quantities, are practically a hand-made product, and this must be eliminated in the future. The concentration of efforts toward enormous climbs and speeds for military purposes has resulted in extremely complex structure, delicate workmanship and expensive materials. However, the military airplane has developed many new materials which will, in the future, result in not only more efficient machines but great reduction of initial cost. The use of waterproof veneer is of utmost importance and if judiciously employed will do away with fully 50 per cent of the number of small and intricate parts. In the past little attention has been given to the interchangeability of parts, it having been the custom to design each part for the particular purpose for which it was desired without regard to its use for different purposes. Proper attention given to this matter would go far toward eliminating the manufacture of airplanes by hand and would reduce both the initial cost and the cost of upkeep.

"One of the airplanes now doing very successful work which has a range of 540 miles at 90 miles per hr. and carrying a load in addition to pilot and passenger of 2000 lb., costs 20 cents per ton-mile for fuel. Reducing this range to 270 miles and utilizing the reduction of the necessary fuel for the carrying of additional load, brings the cost of fuel to 13 cents per ton-mile. It will, therefore, be seen that proximity of landing fields has much to do with the reduction in cost of the operation of an airplane.

Upkeep an Important Item

"Durability has been of very little importance, but for commercial purposes the upkeep becomes an enormous item of cost. This is true not only of the airplane itself but also of the engine propelling it. Both the initial cost and the cost of upkeep are about equally divided between the engine and the airplane, and this engine cost must be greatly reduced. In the most efficient weight-carrying airplanes of to-day with a loading of 20 lb. per hp. the structural weight of the airplane itself is about 30 per cent of the weight of the machine fully loaded, and the weight of the engine is about 20 per cent of the total weight, leaving 50 per cent for fuel and useful load. For a range of 600 miles, the weight of the fuel is about 20 per cent, leaving about 30 per cent for useful load. Improvements in the airplane structure will greatly reduce the percentage of structural weight and will allow the use of heavier engines with corresponding reduction of cost. However, it is very doubtful if the trend of engine design will be in this direction, as efforts will be concentrated toward the increase of the percentage of useful load carried.

"As to the particular type of airplane to be used for commercial purposes, the tractor would seem to be most advantageous. Inasmuch as safety is of the greatest importance and most wrecks occur in landing, the pilot and passenger should be located well to the rear of center of gravity, so that the heavier parts of the machine, such as engines, etc., may reach the ground first, as they are much more capable of absorbing the shock than is a human being. The two classes of accidents which are most common to the airplane are wrecks due to bad landings and nose dives resulting from engine stoppage in climbing out of a field when the altitude is not sufficient for the machine to recover.

Multi-Engined Machines Safer

"It would also appear that multi-engined machines will not only add to the safety of the machine but also reduce the cost per ton-mile and by decreasing the liability of breakage thus reduce the cost of upkeep. You will probably assume that the use of multi-engines means an increase in the weight of the power plant, but on investigation it will be found that the opportunities given for the reduction of the structural weight due to the distribution of loads are so great that the structural weight of the machine will be decreased in far greater proportion than the weight of the engines is increased.

"I would like to point out at this time that the greatest assistance which can be given the airplane engineer in the design of commercial airplanes is the development of suitable engines, of which there are very few in existence at the present time. As with the airplane itself, all attention for the past few years has been given to engines of very high horsepower and extremely light weight, with initial cost and cost of upkeep as purely secondary considerations. It is probable that some of the existing airplane engines, if built in enormous quantities, could be produced at a reasonable cost, but the production of commercial airplanes is, at the present time, somewhat limited, and the growth of the industry must necessarily be gradual. It would, therefore, seem that the production of existing type of engines will not be sufficiently great to get the cost down to a reasonable basis. Engines of medium horsepower would be highly advantageous for smaller types of commercial planes, and a very satisfactory sportsman's machine of the twin-engined type with units of 60 or 70 hp. would be a desirable product, and it should be possible to produce such engines at a comparatively low cost. For this type of machine the air-cooled type of engine would be particularly desirable, inasmuch as the engine may be of comparatively small size and small bore and may be exposed in a manner which would not be practicable in a single-engined type. All air-cooled engines which have previously been brought out have been of a type in which efforts have been made to reduce the weight to an extent far beyond that of the water-cooled type. I believe that an air-cooled engine of medium horsepower, weighing the equivalent of a fully equipped water-cooled engine, including radiator and water, would make an efficient power-plant, and one which could be produced at very low cost."

Promise of Lighter-Than-Air Machines

D'Orcy's paper showed that with improving mechanical structure we may expect the lighter-than-air machine to increase greatly in size and capacity beyond present limits. His contention was that the fundamental facts proved the advantage of very large airships, because the lifting power increases as the cube of the dimensions, while the resistance to passage through air increases only as their square.

This means that as an airship grows larger the weight of the engines necessary to drive it at a chosen speed becomes an ever-decreasing proportion of the total lifting power. This fact is also of value in showing that as ships increase in size there is less necessity for using very light and costly metals in their construction. Beyond a certain size of rigid type it would not pay to use aluminum alloys.

Another expectation of the author is that helium, having a lifting power not greatly inferior to hydrogen, will be available in adequate quantities, and it has the enormous advan-

(*Continued on page* 595)

SIDE GUIDE AND GRIPPE

Performance Data on Airplane Radiators

ENGINE		AIRPLANE				RADIATOR								COMPARATIVE PERFORMANCE															
Make and Model	Approximate B.Hp. Used	Make and Model	Low Altitude Speed, Miles per Hr.			Location	Type and Make	Air Cells	Depth (In.)	Area, Sq. Ft.		Weight, Lb		Probable Air Speed Relative to Radiator, Miles per Hr.		Surface (Sq. Ft.) Factors					Temperature at Low Altitude, Deg. Fahr.				Probable Mean Temp. Diff.		Weight per B.Hp., Lb.	
			Low	During Climb	High					Face	Cooling Surface	Empty	Full	During Climb	High Speed	Area / B.Hp.	Area×Speed / B.Hp. Climb	Area×Speed / B.Hp. High Speed	Area×Speed×Temp. Diff. / B.Hp. Climb	Area×Speed×Temp. Diff. / B.Hp. High Speed	Air at Gr'nd	Radiator Inlet (Throttle Open) Static	Radiator Inlet (Throttle Open) Climb	Radiator Inlet (Throttle Open) High Speed	Climb	High Speed	Empty	Full
[1]Thomas 8	140	L-W-F, V	45	*56	90	Fuselage nose and in slip-stream	Ajax, Honeycomb	13/16"x13/16"	3	3.90000	131.00	Aver. 77.5	Aver. 107.80	93	108	0.9360	87.00	101.10	10,005	10,110	*80–85	.....	*190–195	185	115	100	0.5530	0.7700
[2]Thomas 8	140	L-W-F, V	45	*56	90	Fuselage nose and in slip-stream	Ajax, Honeycomb	13/16"x13/16"	3	4.10000	137.80	....	....	93	108	0.9840	91.50	106.30	10,065	10,100	*90–95	.....	.....	*185–190	110	95	.....	.....
[3]Curtiss OXX-2	100	Curtiss JN-4	43	*51	75	Fuselage nose and in slip-stream	Rome - Turney Honeycomb	0.270"x 0.265"	2 7/8	3.16000	138.20 †	....	....	79	90	1.3820	109.20	124.40	....	....	....	.....	.....	.....	..	..	.....	.....
[3]Curtiss VX	160	Curtiss R-3	*50	*57	80	Fuselage nose and in slip-stream	Rome - Turney Honeycomb	0.270"x 0.265"	3 3/8	4.23000	186.00 †	85.0	118.00	85	96	1.1620	98.80	111.50	....	....	....	.....	.....	.....	..	..	0.5310	0.7370
[4]Sturtevant 5-A	145	Sturtevant S-4	48	*55	75	Leading edge of upper wing	Honeycomb	About 1/4" square	3	2.69000	*107.60 †	....	....	80	90	*0.7420	59.30	66.75	....	....	....	.....	.....	185	..	..	.....	.....
		Martin S	40	*49	75	On upper wing in slip-stream	Flexo Honeycomb	Irregular shape	2 7/8	3.52000	84.10	....	....	78	90	0.5100	39.80	45.90	....	....	....	.....	.....	.....	..	..	.....	.....
Hall-Scott A-5-A	165	L-W-F, V-2	45	*57		On leading edge upper wing out of slip-stream	Ajax Honeycomb	13/16"x13/16"	4	2.64000	118.30	56.0	87.00	57	92	0.7180	40.90	66.00	4,701	6,600	80–90	190–210	.....	185†	115	100	0.3390	0.5270
		L-W-F, V-2	45	*57	2	On leading edge upper wing out of slip-stream	Ajax Honeycomb	13/16"x13/16"		3.33000	149.20	....	....	57	92	0.9050	51.60	83.25	5,160	7,075	80–90	.....	.....	170	100	85	.....	.....
[6]Liberty Experimental 8. (High compression)	220	L-W-F, F	45	*63	115	On leading edge upper wing out of slip-stream	Ajax Honeycomb	13/16"x13/16"	4	4.05000	182.00	86.0	139.00	63	115	0.8270	52.10	95.00	6,250	9,975	*80–85	.....	.....	185-190	120	105	0.3910	0.6320
[7]Liberty Experimental 8. (High compression)	220	L-W-F, F	45	*63	115	Leading edge upper wing, about 1/3 in slip-stream	Ajax Honeycomb	13/16"x13/16"	4	2.26000	101.20	Figure of no value as radiator partly covered		67% = 63 33% = 117 Mean= 81	67% = 115 33% = 138 Mean= 123	0.4600	37.27	56.60	4,470	6,226	*65–70	.....	.....	180	120	110	.....	.....
[8]Liberty 12 (Low compression)	327	L-W-F, G	*48	*69	130	Leading edge upper wing, most in slip-stream	Ajax Honeycomb	13/16"x13/16"	4	2.38000	106.80	Figure of no value as radiator partly covered		33% = 69 67% = 130 Mean= 110	33% = 130 67% = 156 Mean= 147	0.3260	35.87	47.90	5,740	7,185	*20	.....	.....	170	160	150	.....	.....
[9]Sturtevant 5-A	145	L-W-F, V-1	45	*57	92	Fuselage nose and in slip-stream	Ajax Honeycomb	13/16"x13/16"	3	3.67000	123.30	....	....	96	110	0.8500	81.60	93.50	9,385	9,350	....	.....	.....	185-187	115	100	.....	.....
[10]Hall-Scott A-7-A	110	Standard	...	...	.....	Above engine in slip-stream	Flexo (?)	Irregular shape	5	1.50000	*68.70 (if Flexo)	....	....	.....	.....	*0.6250 (If Flexo)	....	....	....	....	....	.....	.....	.....	..	..	.....	.....
[6]Liberty 12 (High compression)	430	L-W-F, G-1	50	*71	135	Upper water pocket built into edge of upper wing, nearly all in slip-stream	Ajax Honeycomb	13/16"x13/16"	5	3.75000	210.00	88.0	155.00	25% = 71 75% = 136 Mean= 120	25% = 135 75% = 162 Mean= 155	0.4880	58.60	75.70	7,320	7,195	70–80	Boils after 1 min.	.....	170	125	95	0.2050	0.3610
[11].....	140	.....	...	...	.....	In curve of wing	Motor Radiation Co. Multitube Honeycomb	1/4 in. diameter	4 1/2	2.89000	130.00	45.0	....	.....	.....	0.9280	....	....	....	....	....	.....	.....	.....	..	..	0.3220	.....
[12]Siddeley	210	British DH-4	*55	*69	112	Pivoted below fuselage, all in slip-stream	Motor Radiation Co. Multitube Honeycomb	1/4 in. diameter	4	2.08000	83.20	....	....	117	134	0.3960	46.30	53.10	....	....	....	.....	.....	.....	..	..	.....	.....
[13]Liberty 12 (High compression)	Probably 400	Standard Co. DH-4	60	*77	128	Fuselage nose in slip-stream	Livingston Honeycomb	Probably 5/8 in. cl. to cl.	4	5.55000	311.00 †	....	....	132	154	0.7770†	102.50 †	119.60 †	....	....	....	.....	.....	.....	..	..	.....	.....

[6]Liberty 12 (High compression)	Probably 400	Standard Co. DH-4	60	*77	128	Fuselage nose in slip-stream	Mayo Honeycomb	Probably 0.275"x 0.275"	4⅞	6.16000	*432.00 †	96.0	....	132	154	*1.0800†	142.50 †	166.40 †	....	....	....	.....	.....	.....	..	..	0.2400	.....
[15]Mercedes	160	Albatross	.....	.....	.....	In curve of upper wing, probably in slip-stream	Tubular	Space between tubes	Same as wing curve	Aver. 2.08500	48.62	27.5	48.34	.....	.....	0.3035 †	....	....	....	....	....	.....	.....	.....	..	..	0.1720	0.3020
[16]Liberty 12 (Low compression)	385	Curtiss, L-W-F, HS-1-L	57	*65	87	In front of engine (pusher type) not in slip-stream	Livingston Honeycomb	1/4 in. cl. to cl.	5	5.60000	336.00	96.0	165.50	65	87	0.8730	56.70	76.00	6,237	7,220	*60-70	.....	.....	160	110	95	0.2495	0.4300
[17]Mercedes	260	Friedrichshafen Bomber	*50	*61	93	In front of engine nacelle (pusher) not in slip-stream	Honeycomb	1/4"x1/4"	Probably about 4 to 5 in.	1.79000	*143.00 (?) †	....	....	61	93	*0.5500 (?)†	33.55 †	51.20 †	....	....	....	.....	.....	.....	..	..	.....	.....
[18]Rolls-Royce Series 8	360	British F-5	57	*65	*87	In front of engine in slip-stream	Honeycomb	3/4"x3/4"	.....	9.30000	.....	....	....	94	104	.....	....	....	....	....	....	.....	.....	.....	..	..	.....	.....
[19]Hall-Scott A-5 A-5-A A-7 A-7-A	....	.....	.....	.....	Probably less than 90	In front of engine in slip-stream	Probably based on Flexo	.....	Probably 3½ or 4 in.	0.02555 per B.Hp.	.....	....	....	.....	.....	If Flexo 3.5"=0.746 4.0"=0.850	....	....	....	....	....	.....	.....	.....	..	..	.....	.....
						On leading edge of upper wing	Probably based on Flexo	.....	Probably 3½ or 4 in.	0.02048 per B.Hp.	.....	....	....	.....	.....	If Flexo 3.5"=0.598 4.0"=0.682	....	....	....	....	....	.....	.....	.....	..	..	.....	.....
						On sides of body in slip-stream	Probably based on Flexo	.....	Probably 3½ or 4 in.	0.03575 per B.Hp.	.....	....	....	.....	.....	If Flexo 3.5"=1.043 4.0"=1.190	....	....	....	....	....	.....	.....	.....	..	..	.....	.....
						On fuselage nose in slip-stream	Rome - Turney Honeycomb	0.270"x 0.265"	.....	....	.....	....	....	.....	.....	1.0800	....	..	..	..	..	..	..	..	..	..	..	App. 0.5500	App. 0.6800
						On side of fuselage in slip-stream	Rome - Turney Helical Tube	.....	.....	....	.....	....	....	.....	.....	0.8500	....	..	..	..	..	..	..	..	..	..	..	App. 0.5500	App. 0.6800
Several	....	Several			Probably less than 85	.....	Honeycomb	.....	.....	....	.....	....	....	.....	.....	2.7000 evidently too high 2.0000 evidently too high	ntly	....	....	....	....	.....	.....	.....	..	..	.....	.....
						.....	Flattened Aluminum Tubes	.....	.....	....	.....	....	....	.....	.....		....	....	....	....	....	.....	.....	.....	..	..	.....	.....
Liberty 12 (High compression)	Probably 400	Le Pere Fighter	*50	*72	136	In upper wing at slight angle in slip-stream	Flat plate type	Long 1/16" slot between plates	8 Vertically	4.54000	260.00	....	....	138	163	0.6500	89.70	106.00	....	....	....	.....	.....	.....	..	..	.....	.....
	Probably 400	Le Pere Fighter	*50	*72	136	In upper wing at slight angle in slip-stream	Flat plate type	Long 1/16" slot between plates	.....	*5.24000	*278.00	....	....	138	163	*0.6970	96.20	113.60	....	....	....	.....	.....	.....	..	..	.....	.....
	Probably 400	USD-9 (Modified DH-9)	*55	73	125	In upper wing at slight angle in slip-stream	Flat plate type	Long 1/16" slot between plates	.....	4.76000	253.00	....	....	129	150	0.6330	81.70	95.00	....	....	....	.....	.....	.....	..	..	.....	.....
	430	L-W-F, G-2	50	*75	135	In curve of upper wing	Ajax Honeycomb	11/11"x11/11"	5	8.20000	255.00	....	....	138 (?)	162 (?)	0.5930†	81.85 †	96.10 †	....	....	....	.....	Boiled in steady climb	*185	..	..	.....	.....
	430	L-W-F, G-2	50	*75	135	In curve of upper wing	Albatross Tubular Type	Space between tubes	Same as wing curve	6.54000	175.30	....	....	138 (?)	162 (?)	0.4080†	56.30 †	66.20 †	....	....	....	.....	Boiled in steady climb	*185	..	..	.....	.....
[20]Hispano-Suiza	150	Standard Aero E-4 Mail Plane	50	*63	100	On fuselage nose in slip-stream	Livingston Honeycomb	Probably 1/4 in. cl. to cl.	.....	....	129.00	74.5	....	108	120	0.8600	92.90	103.20	....	....	....	.....	.....	.....	..	..	0.4970	.....
[1]Curtiss OX	90	Curtiss (Probably JN-2)	43 (Base	*51	75 d on JN-4)	If JN-2· On fuselage nose and in slip-stream	Rome - Turney Honeycomb	0.270"x 0.265"	3⅜	2.89500	124.40 †	57.0	90.00	79	90	1.3830	109.30	124.50	....	....	....	.....	.....	.....	..	..	0.6330	1.0000
[2]Curtiss OXX-2	100	Curtiss JN-3(?)	43	*52	*78	On fuselage nose in slip-stream	Rome· Turney Honeycomb	0.270"x 0.265"	2⅞	2.79000	121.80 †	57.0	83.00	82	94	1.2180	99.80	114.40	....	....	....	.....	.....	.....	..	..	0.5700	0.8300
[3]Curtiss VX	160	Curtiss	...	...	.....	.....	Rome - Turney Honeycomb	0.270"x 0 2650"	3⅞	4.74000	285.00 †	85.0	117.00	.....	.....	1.7800	....	....	....	....	....	.....	.....	.....	..	..	0.5310	0.7310
[3]Orlo	140	.....	...	...	.....	.....	Rome - Turney Honeycomb	0.270"x 0.265"	3⅞	4.08000	208.40 †	77.0	116.00	.....	.....	1.4880	....	....	....	....	....	.....	.....	.....	..	..	0.5500	0.8280
[4]Curtiss OXX-2	100	Burgess	...	...	.....	.....	Rome - Turney Honeycomb	0.270"x 0.265"	3⅞	4.65000	200.00 †	88.0	118.00	.....	.....	2.0000	....	....	....	....	....	.....	.....	.....	..	..	0.8800	1.1800
[5]Liberty 12 (High compression)	420	Bristol Fighter	*55	*76	* 140	On fuselage nose in slip-stream	Rome - Turney Honeycomb	0.270"x 0.265"	4⅛	3.75000	232.60 †	92.0	132.00	142	168	0.5530	78.50	93.00	....	....	....	.....	.....	.....	..	..	0.2190	0.3140
[5]Liberty 12 (Low compression)	*385	Curtiss H-16	55	*65	95	In front of engine in slip-stream	Rome - Turney Honeycomb	0.270"x 0.265"	4⅛	4.79000	320.00 (Nearly checks)	103.0	152.00	100	114	0.8310	83.10	94.75	....	....	....	.....	.....	.....	..	..	0.2675	0.3950
[5]Liberty 12 (Low compression)	*385	Curtiss HS-1-L	57	*65	87	In front of engine (pusher) not in slip-stream	Rome - Turney Honeycomb	0.270"x 0.265"	4⅛	5.58000	372.70 (Nearly checks)	105.0	153.00	65	87	0.9680	62.90	84.20	....	....	....	.....	.....	.....	..	..	0.2730	0.3970

FOR REFERENCE NOTES SEE PAGE 594

Performance Data on Airplane Radiators—*Continued*

ENGINE		AIRPLANE				RADIATOR								COMPARATIVE PERFORMANCE																	
Make and Model	Approximate B.Hp. Used	Make and Model	Low Altitude Speed, Miles per Hr.			Location	Type and Make	Air Cells	Depth (In.)	Area, Sq. Ft.		Weight, Lb.		Probable Air Speed Relative to Radiator, Miles per Hr.		Surface (Sq. Ft.) Factors					Temperature at Low Altitude, Deg. Fahr.						Weight per B.Hp., Lb.	
			Low	During Climb	High					Face	Cooling Surface	Empty	Full	During Climb	High Speed	Area B.Hp.	Area × Speed B.Hp.		Area × Speed × Temp. Diff. B.Hp.		Air at Gr'nd	Radiator Inlet (Throttle Open)			Probable Mean Temp. Diff.		Empty	Full
																	Climb	High Speed	Climb	High Speed		Static	Climb	High Speed	Climb	High Speed		
[7]Curtiss VX-3	200	Curtiss R-4	48	*59	90	On fuselage nose in slip-stream	Rome-Turney Honeycomb	0.270"x 0.265"	.....	....	.....	.....	.....	94	108	1.0800	101.50	116.70	....	....	....	.....	.....	.....	.....	..	..	.....	.....
						On fuselage nose in slip-stream			Based on Flexo area 3½	0.02780 per B.Hp.	.....	....	....	.....	.....	0.8125	....	....	....	....	....	.....	.....	.....	..	..	0.5100	0.9000
						On side of fuselage			.....	0.05000 per B.Hp.	.....	....	....	.....	.....	0.7225	....	....	....	....	....	.....	.....	.....	..	..	0.5600	0.8100
[28]Several	....	Several	....	....	Probably less than 90	Overhead in slip-stream	Flexo Honeycomb	Irregular shape	Based on Flexo area app. 5	0.01875 per B.Hp.	.....	....	....	.....	.....	0.7780	....	....	....	....	....	.....	.....	.....	..	..	0.3800	0.6800
						Over engine			Based on Flexo area 2⅞	0.03470 per B.Hp.	.....	....	....	.....	.....	0.8400	....	....	....	....	....	.....	.....	.....	..	..	0.3900	0.6200
Rolls-Royce	250	Handley Page	*55	*61	*90	On side of fuselage, not in slip-stream	Flat Tube	.....	.....	....	150.00	....	....	64	90	0.6000	38.40	54.00	....	....	....	.....	.....	.....	.....	..	..	.....	.....
[29]Salmson A-9	230	Paul Schmitt	...	...	.....	On leading edge of upper wing in slip-stream	Honeycomb	Probably ¼ or ⅜ in.	3½	2.70000	*121.50	....	....	.....	.....	*0.5280	....	....	....	....	....	.....	.....	.....	..	..	.....	.....
.....	....	Aviatik	...	...	.....	On leading edge of upper wing in slip-stream	Honeycomb	Probably ¼ or ⅜ in.	Probably deep (4 to 5)	.....	.....	....	....	.....	.....	0.7200	....	....	....	....	....	.....	.....	.....	..	..	.....	.....
Liberty 12 (Low compression)	385	Curtiss H-12	53	*61	95	In front of engine nacelle in slip-stream	Livingston Honeycomb	⅜ in. cl. to cl.	5	5.22000	313.00	98.0	170.00	100	114	0.8130	81.30	92.60	....	....	....	.....	.....	.....	.....	..	..	0.3545	0.4420
Liberty 12 (Low compression)	385	Curtiss H-12	53	*64	95	In front of engine nacelle in slip-stream	Livingston Honeycomb	⅜ in. cl. to cl.	5	7.08000	425.00	122.5	205.00	100	114	1.1030	110.30	125.90	....	....	....	.....	.....	.....	.....	..	..	0.3180	0.5320
Hispano-Suiza	150	Curtiss N-9	44	*52	*80	Above engine in slip stream	Livingston Honeycomb	⅜ in. cl. to cl.	5¼	1.89000	119.00	41.3	66.50	84	96	0.7930	66.70	76.20	....	....	....	.....	.....	.....	.....	..	..	0.2750	0.4430

*Estimated data. Temperature data very approximate.

†See note.

[1]L-head engine cast-iron cylinders. Housed and ventilated.

[2]L-head engine, cast-iron cylinders. Housed and ventilated. Plane for use in Texas.

[3]Areas do not exactly check data on radiation used. Based on miscellaneous and Rome-Turney Co. data.

[4]Overhead valves area estimated assuming 40:1=surface : face.

[5]Overhead valves.

[6]Overhead valves. Cylinder heads exposed to slip-stream.

[7]Overhead valves. Cylinder heads exposed to slip-stream. Same radiation as No. 9, but in slip-stream and part covered.

[8]Overhead valves, cylinder heads exposed. An old radiator part covered up.

[9]Overhead valves, housed in and ventilated.

[10]Make of radiation not certain, probably Flexo, 5½-in. section.

[11]Designed from British data. Tubes 60 deg. to Chord Motor Radiation Co. data.

[12]D. W. Douglas. data

[13]Section used uncertain, assumed=⅛ in.x1/16 in. Radiator probably *under*sized.

[14]Probably *over*sized. Section used uncertain, assumed=0.275 in.x0.275 in.

[15]Area includes water pockets. Data does not check L-W-F experiments.

[16]Water flow about 97 gal. per min.

[17]British official report data, depth, etc., uncertain, assumed 80:1=Area : Face (5 in.).

[18]Arch cut out of honeycomb to clear engine.

[19]Data from recommendations of Hall-Scott Co. (1917.).

[20]Rome-Turney, etc., data per Hunsaker in *Aerial Age* May 29, 1916.

[21]German practice per Prof. Haffner in "Handbuch für Flugzeugkonstrukteure-Hunsaker" in *Aerial Age* May 29, 1916.

[22]96 plates=8 in.x24⅜ in., ⅜ in. cl. to cl. First installation.

[23]Later installation.

[24]Slip-stream doubtful. Too small for climb, O. K. for high speed.

[25]922 tubes 1/8 in.x½ in.x24 in. run crosswise. Too small for climb, O. K. for high speed.

[26]T. H. Huff data.

[27]Miscellaneous and D. W. Douglas data.

[28]Flexo radiation data, *Aviation*, December 15, 1917.

[29]Area estimated, assuming 45:1=Surface : Face.

(*Continued from page* 591)

tage of being absolutely inert, that is to say it is as uninflammable as nitrogen.

D'Orcy said that airships of existing types could be depended upon to cross the Atlantic in 60 hours carrying a substantial load. He said that the famous British engineering firm of Vickers, Ltd., one of the largest concerns in Europe, had already announced that they would soon commence a regular service between England and America on a 60-hour schedule. They plan to run two ships in each direction each week and estimate that the adventure will be profitable at a fare of $250 per passenger.

The rapid increase in *useful* load capacity of airships is shown by comparative figures for two typical German ships. In 1914 a large German ship had a gross lift of 30 tons and useful lift of 8.5 tons. A larger ship of similar type built last year has a gross lift of 66.6 tons—little more than double—and a useful lift of 39 tons—nearly five times.

This means that with very large ships passengers would be able to be accommodated in real comfort, be properly housed and fed and generally as well looked after as on an ocean liner and yet make the trip at three times the speed of the fastest of them.

It is in such long-distance trans-oceanic work that d'Orcy sees the greatest immediate future for the airship. Also the engine power required for a given speed as the size of the ship grows means that with every increase in bulk the cost of transportation per unit of useful load will decrease.

Theoretically, almost the reverse is the case with an airplane whose lifting ability as well as its translational speed has to be provided by engine power. It therefore appears probable that airplanes and airships will develop independently for different classes of usefulness and have fields almost as dissimilar as those of the railroad and the steamship. Competition between the two types of aircraft is not to be expected; co-operation is more likely, the one offering the speediest long distance transportation and the other the fastest form of short distance travel.

A very useful paper of a totally different character also read at the meeting was one on airplane radiators by Archibald Black, U. S. N. This paper contains a great amount of carefully collected data dealing with the efficiency of different types of radiator, the effect of different mountings on the airplane and numerous other vital factors.

This paper, being mainly composed of collected facts, is almost impossible to digest. The uppermost thought after hearing it is that much still remains to be discovered before the last word on the subject can be written. In a general way the conventional mounting on the nose of the fuselage or nacelle appears the most efficient and satisfactory, but a good deal of premise lies in the types of radiator which are built into the wings so as to make almost an integral part of the wing surface. The author pointed out that methods of controlling motor temperature were only partly developed and his comments suggest that there is a field for efficient automatic control, the automobile form of thermostat having some disadvantages. The principal tabulation of data from this paper is reprinted on pages 592, 593 and 594.

Egotism in Business a Grave Error

(*Continued from page* 577)

This is one of the most dangerous mental attitudes that a concern can take, because while it stands still the rest of the world progresses around it, leaving it to go relatively backward. A consulting engineer who is well up on existing trends of developments can readily cure this. A concern which calls in a consulting engineer regularly will never take this mental attitude. Year by year better products are going to be turned out and not in our generation nor the next will the ultimate in any man-made product be reached.

The consulting engineer is often in a position to interpret complaints from customers and service stations. The plant engineer may fail to read between the lines and see how these complaints bear relationship to one another and perhaps vitally affect the product. The consulting engineer who is trained along these lines can readily be of material benefit in this respect alone.

In the creation of new designs the broad vision of the consulting engineer is most necessary. When a plant engineer sets out to design something entirely new it is difficult for him to remove from his mind problems with which he has been wrestling daily.

The consulting engineer on the other hand is able to sketch his mental picture of a future design from the far broader viewpoint of a man who has continually surveyed the entire field. He can sketch the outline and the main points in a way which will bring home vividly to the plant engineer the general state of the art and the plant engineer from his detail experience can fill in the minor points, and perhaps in the light of his intimate knowledge, suggest improvements which will go far to improve the quality of the new product. The consulting engineer and the plant engineer make an ideal combination on the creation of new designs.

In checking and testing work, the services of the consulting engineer are also practically indispensable. It is impossible for a man who has done a piece of work to check it properly by himself. He must call in an outside man. The plant that fails to do this is laying itself open to great criticism. It is a vital point that errors which may be found in checking or testing may be found early and before production plans are too far advanced.

After having made his test and done the checking the consulting engineer is in a position to suggest improvements which will tend to make the product better and these can be discussed in conference by the various department heads of the plant and the consulting engineer.

It must be remembered that the consulting engineer is not the man to make the final decision. He is the man to make the suggestions and give the reasons for his suggestions. It is up to the plant department heads and to the plant executives finally to decide on what is done, but by his presence at conferences the consulting engineer is able to inject lines of thought into the consultation which perhaps would never enter the mind of anyone connected with the plant. He brings into the discussion the broader thoughts of the outside world, which must be considered if the plant is going to successfully produce products that are going to be broadly sold.

The retention of a consulting engineer can never be a reflection on the personnel of an organization or on its product. Nor is the consulting engineer failing in his duty when he is not able to suggest any practical improvements over what has been reached in the plant. If he cannot do so in view of his broad experience and if he is the proper man for the job, his confirmation alone is worth much to the entire manufacturing organization.

The name of the consulting engineer need never be mentioned in connection with its production. He is a confidential adviser and in much the same way as the auditor or legal counsel, who are called in by concerns of every type. As a check on the ideas of the organization he can be invaluable and his value is largely determined by his broadness of vision, by his wide range of experience and by his diligence in securing, cataloging and keeping at his fingers' end a wide and complete range of information.

Campbell All-in-Mesh Gearset

Utilizes Tilting Key for Locking Layshaft Gears

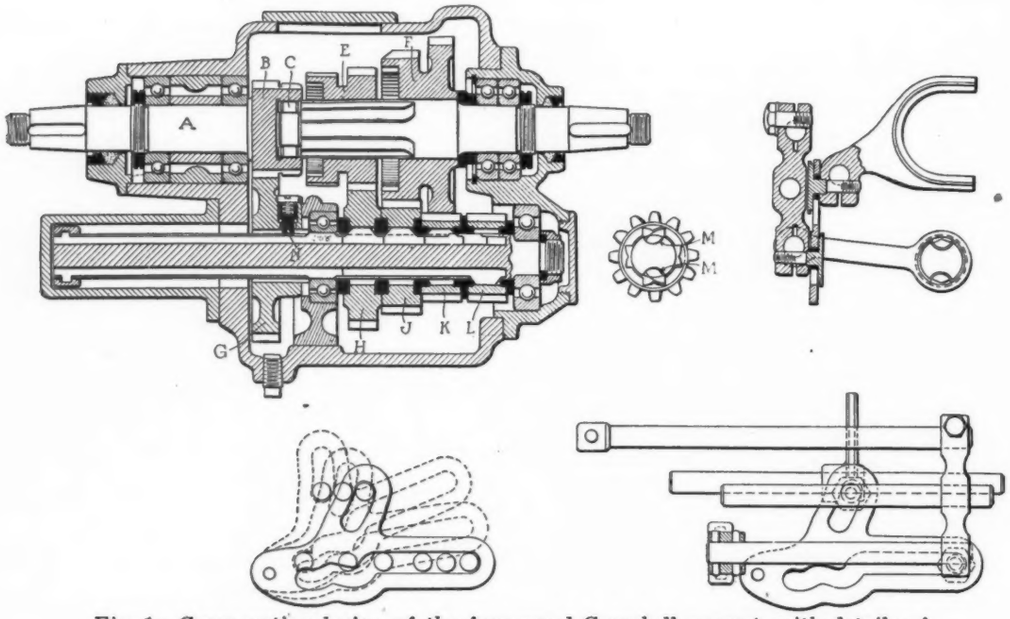


Fig. 1—Cross-sectional view of the four-speed Campbell gearset, with details of layshaft gears, cam plate and shifting mechanism

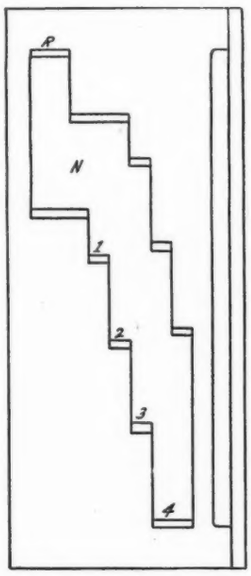


Fig. 2—Change speed lever plate used with Campbell gearset

THE Campbell all-in-mesh type of gearset is one wherein the gears are constantly in mesh, with the countershaft or layshaft gears locked internally by what is termed a rolling key. Thus the different speeds except high gear are secured by shifting the key under the desired gear.

Inasmuch as the clutching devices are located immediately under the layshaft gears and not at the sides, the Campbell gearset is shorter than other in-mesh types, resulting in but 6 in. center to center between bearings on the layshaft, and this on a 2- to 3-ton four-speed truck transmission. Model 50 is illustrated. One of these has been in use for several months in a 2-ton Garford truck at the Great Lakes Naval Station, where it has been subjected to much severe handling. A representative of the Class Journal Co. drove this truck over all sorts of roads, bringing the gearset lever into the various speeds without touching the clutch pedal and regardless of engine revolutions.

Fig. 1 shows a cross sectional view of the four-speed truck transmission, together with details of the layshaft gears, cam plate and shifting mechanism. As shown the gears are in third speed. The primer shaft *A*, which connects to the engine or clutch shaft, is supported on two No. 308 single row ball bearings and carries on its inner end the constant mesh gear *B*. The latter is recessed for the solid roller bearing *C* supporting the mainshaft *D*, which is supported at the rear by a double row No. 308 ball bearing.

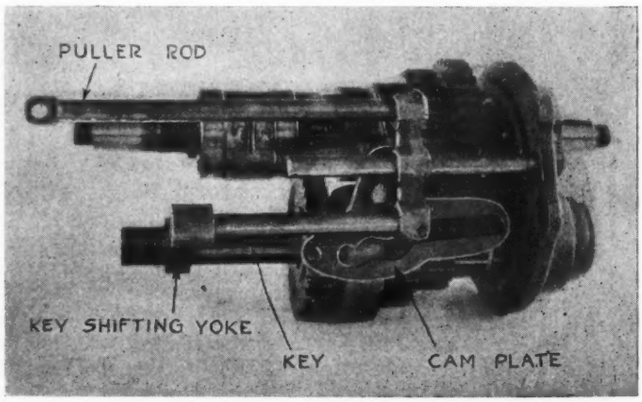
Shaft *D* is splined for the sliding member *E*, while the double gear *F* is spooled on the shaft and revolves with the shaft only when *E* is clutch-meshed with it, that is, the external teeth of the sliding gear are meshed with the internal teeth in *F*.

As shown, *F* remains idle, the shaft revolving inside of it. The bearing surfaces of this part of the shaft and inside the gear *F* are hardened. High gear is obtained when *E* is brought forward to clutch-mesh with *B* in practically the same way as is done in conventional gearsets, where the internally cut form of sliding gear is used in place of a dog clutch.

Immediately below gear *B* and in mesh with it is the constant gear *G*, an integral part of the layshaft. Adjacent to *G* is a single row No. 308 ball bearing, and then follow gears *H*, *J*, *K* and *L*, constituting the third, second, first and reverse speed gears respectively. The reverse pinion idler is not shown, but is just back of *K* and *L*, being the same length as these two combined. The bearing at the rear end of the layshaft is a single row No. 406. The bearings of the layshaft are close to the gears where the greatest load comes, minimizing the danger of a sprung shaft.

The gears of the layshaft except *G* are mounted on collars or rings acting as bearing surfaces. This can be a steel on steel construction or through brass bushings, balls, etc., as these bearings carry none of the load, but only the weight of the gear. The transmitting action is secured by simply sliding the key or keys along the circular longitudinal grooves

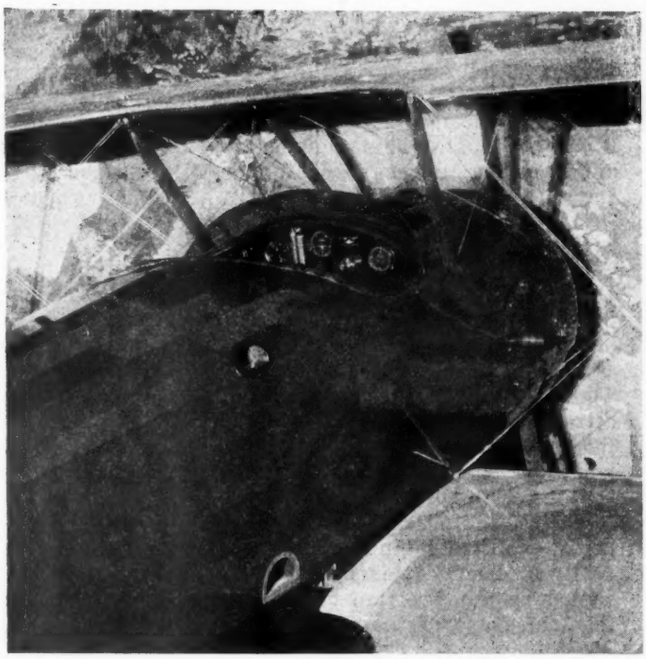
(*Continued on page* 601)



Complete shifting mechanism, showing single pull rod at top

Second Impressions of the Aeronautic Show

Some Mechanical Novelties Seen Among the Exhibit of Planes, Engines, Parts and Equipment—Educational Features Prominent—International Character of the Exhibition



Side-by-side seat of Thomas-Morse biplane. Note how instruments are arranged on cowlboard

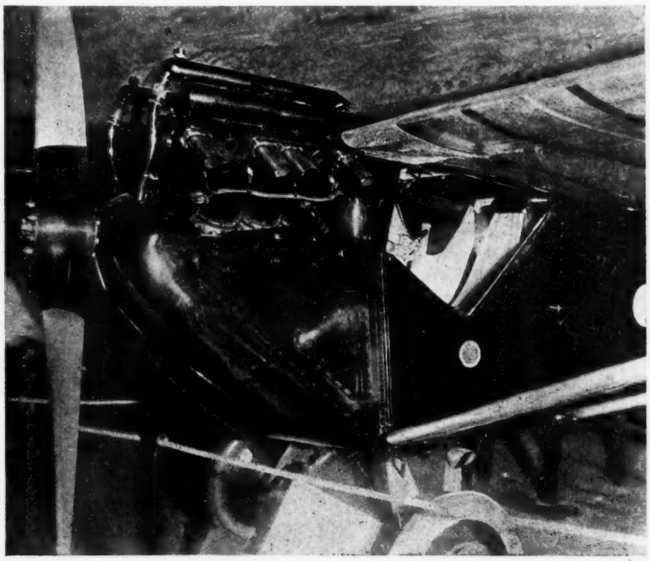
THE aeronautical industry is to be congratulated on the fine show it has staged at Madison Square Garden and Sixty-ninth Regiment Armory. There has seldom been an industrial exhibition in New York City with an equally attractive setting and as fully representative of the industry which fostered it. A very marked contrast is noticeable between this and the previous aeronautic show, in that the variety of exhibits is now much wider and the public is flocking to the show in much greater numbers.

There is more of an educational and less of a commercial aspect to the present aircraft show than to most other events of the kind. Among the great variety of types of airplanes shown, from the diminutive monoplane to the giant triplane bomber, war planes largely predominate. These have been the exclusive product of the exhibiting firms for the past several years, and they are the criteria of the achievements and the ability of their makers. Commercial uses of these same machines are being mentioned, which are said to call for only slight alterations in design, but one inclines to the belief that such machines would be subject to the same limitations as a passenger automobile converted into a commercial vehicle. Just what the chief points are in which a specially designed commercial plane would differ from a plane designed for military use it is hard to say. On first consideration one would be inclined to say that it would be lower-powered and therefore less speedy, because fuel economy is of greater importance in commercial work. However, some of the leading engineers in the aeronautical field take the opposite view, arguing that the only advantage of the airplane over competing systems of transportation is its higher speed, and that in order to justify its higher cost of operation this advantage of higher speed must be developed to the utmost.

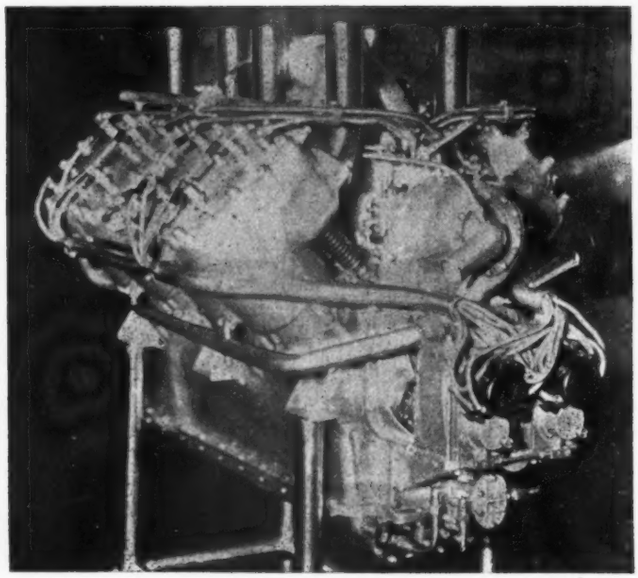
Practically every type of airplane and engine manufactured in this country during the war is being exhibited, in addition to some foreign material, both Allied and captured enemy. Most of the planes and engines have become well known to the public during the war and especially since the armistice was signed.

Super-Charging by Centrifugal Blower

At the stand of the Sturtevant Co. is seen an attachment designed to solve the problem of maintaining the power of an engine constant irrespective of altitude. This takes the form of a centrifugal blower attached to the end of the engine, for the purpose of forcing into the cylinders a greater charge than they could obtain by direct suction at high altitude. The blower is belt-driven and there is an idler pulley on the belt which is forced against it by a piston in a cylinder subjected to the atmospheric pressure, so that when this pressure drops the idler pulley is forced against the belt and causes the blower to run at greater speed. It is claimed



Front portion of Loening two-seater fighter. Note hammock seat and the position of the radiator indicated by the ring below the body



Thomas-Morse eight-cylinder engine

that only 5 per cent of the engine power is required to drive the blower. In view of the fact that at an altitude of 20,000 feet the power of an engine normally drops to 50 per cent, owing to the levity of the air, such a blower should be a useful attachment. The automatic belt tightener prevents an extra charge being pumped into the cylinders while at low altitudes and thus protects the engine from injury due to excessive explosion pressures.

That the design of the larger planes is still in its infancy is a conclusion arrived at after a comparison of the different types exhibited. The great Caproni, for instance, has a landing gear comprising two four-wheeled trucks, one under each of the engine nacelles, while the Martin bomber has a landing gear comprising four wheels mounted co-axially. A feature of interest noted on the Caproni, a night-bombing machine, is a series of electric projectors mounted under the rear edge at a downward inclination. They can be fed from a generator on one of the engines and should be a great help in making a landing at night.

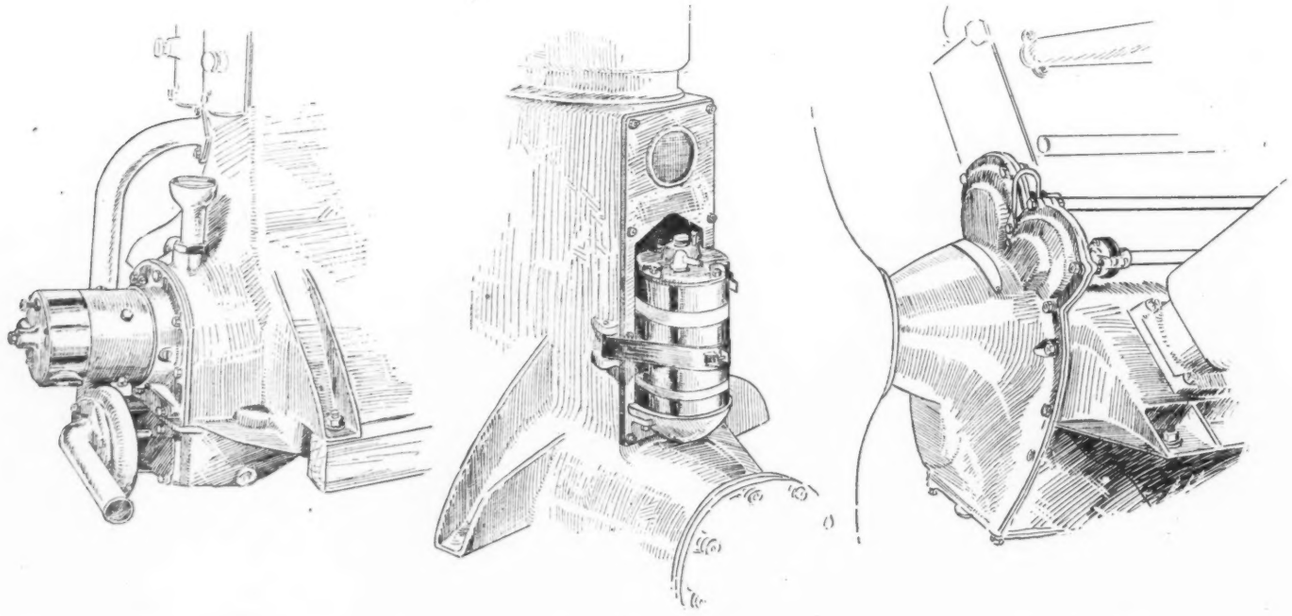
Writing of the Caproni reminds one that there is at least one other Italian exhibit at the show, and a very impressive one, by the Ausaldo firm of Genoa. This is one of the largest Italian industrial enterprises, corresponding somewhat to Krupps in Germany and Schneider in France. There are also some French planes as well as the Handley-Page of British origin, but the Italian stands out among the foreign exhibits.

Among the new engines shown is the W. B. B. two-cycle. This is a 4-cylinder air-cooled machine giving 38 hp. It is a regular three-port type engine with the inlet manifold to the crankcase cast integral with this part. Having no valves and no water cooling system, this type of engine is a model of simplicity. Engineers would probably be inclined to question its fuel economy, and the manufacturers have sought to set at rest any doubts regarding this matter by displaying prominently a sign conveying the information that the fuel consumption is 6 gal. per hour. This engine is fitted to a small plane known as the Messenger, exhibited at the Garden by the Dayton-Wright Airplane Co.

King-Bugatti Engine

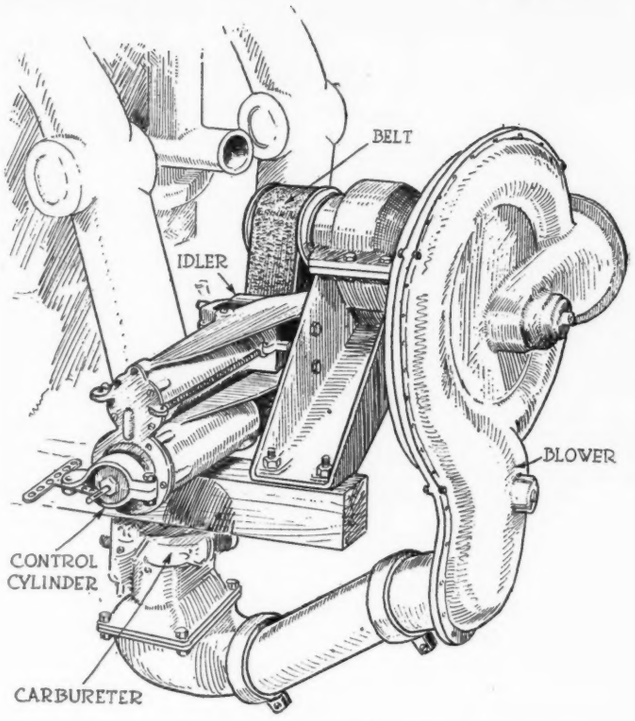
Considerable attention is being paid by visitors to the Duesenberg exhibit, which comprises the Duesenberg 800 h.p. 16-cylinder engine, the King Bugatti engine, as made by the Duesenberg Motors Corp., and a smaller 4-cylinder Duesenberg engine with 4⅜ x 7-in. cylinders. The unusual arrangement of the cylinders on the Bugatti attracts attention, there being practically two eight-cylinder vertical engines side by side, geared to a central hollow propeller shaft. This shaft is of such large size that it permits of shooting through it with a 1½-in. gun.

In the "Restaurant" of the Garden are shown a number of captured engines including a Mercedes 160 and an Austrian Hier. It is believed that the latter was designed by the Austrian racing driver Hieronymus, and that the name of the engine is an abbreviation of his



Starter mounting Generator mounting Magneto drive

Details of six-cylinder Aeromarine engine



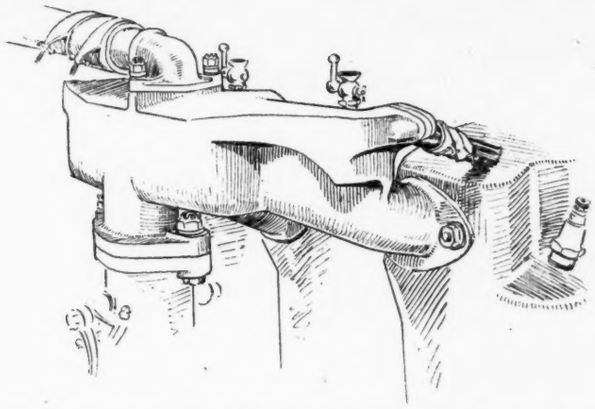
Super-charging by means of a centrifugal blower on Sturtevant engine

name. This engine has the vertical shaft for driving the overhead camshaft at the middle, between the third and fourth cylinders. A very simple compression relief is used on this engine. It acts on the inlet cams and prevents these from closing when set. It consists of two tubes running parallel with the tappet levers. There are slots cut in the tubes where the tappet levers cross it, and when the compression relief is not set the levers move into these slots and the valves can open and close freely. When the tubes are rocked around their axes, by means of a handle which joins to both, the valves are prevented from closing fully and the compression is relieved.

Two Aeromarine Engines Shown

The Aeromarine Plane & Motor Co., New York, exhibits two types of engine. One of these is a six-cylinder 4½ x 6½ in., weighing 375 lb. (405 lb. with electric starter and generator) and rated to deliver 130 h.p. at 1625 r.p.m. The main portion of the crankcase and cylinder jackets are cast integrally of aluminum alloy. The cylinder sleeves are alloy steel forgings, machined all over, to give a uniform wall thickness. After machining, the sleeves are heat treated and the working surfaces ground. The outsides of these sleeves are in direct contact with the cooling water over their entire surface. The cylinder-head gasket, of copper and asbestos, makes a tight joint against the top flange of each cylinder sleeve. The water joint at the bottom of each sleeve is sealed by a cork gasket, which allows freedom for expansion.

The cylinder head and valve gear form a self-contained unit, which can be removed from the combustion chamber, making it possible to remove the carbon or grind the valves. This head may be removed and replaced without re-timing the engine, owing to a special arrangement of the splined shaft which drives the camshaft gear. The head is of aluminum alloy with gray iron valve seats cast in position. The combustion chambers are machined.

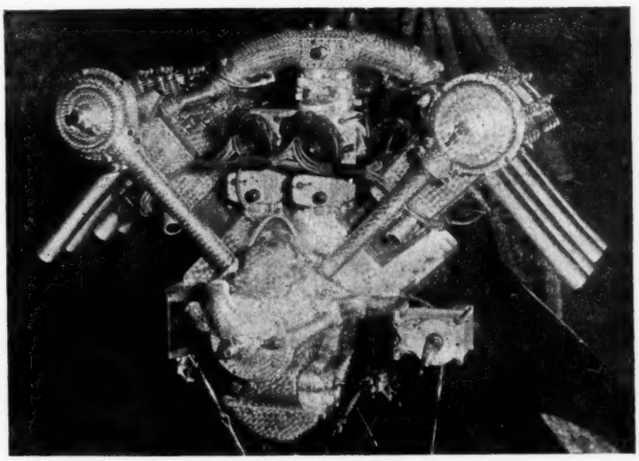


Water-jacketed manifold on Liberty Six engine showing the connections to the engine jacket

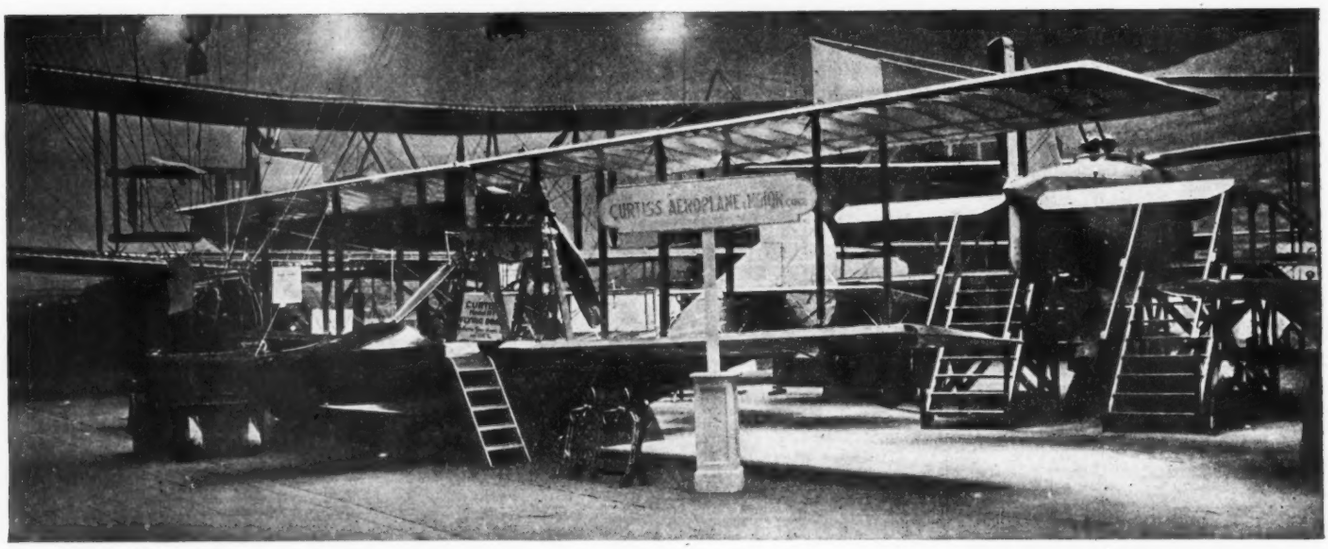
There are four valves for each cylinder. A special design of valve gear, embodying flat multiple leaf valve springs, effects a great reduction in length and weight of valves and valve levers, and also reduces the overall height of the engine. Each valve spring actuates two valves. There is an oil return passage from each end of the cylinder head to the crank sump. The whole valve gear is enclosed in a quickly detachable aluminum cover. A feature of the oiling system is that the oil, while passing to the auxiliary tank and from same to the engine bearings, is cooled by being passed through jackets on the inlet pipes.

The other engine of the Aeromarine Plane & Motor Co. is an eight-cylinder with two cast-iron cylinder blocks of four cylinders each, which are set to make an angle of 90 degrees with each other. It has a bore of 3⅝ in., a stroke of 5⅛ in. and develops 148 h.p. at 1300 r.p.m. Ignition is by two Dixie magnetos which are mounted side by side at the timing-gear end and are driven by two parallel shafts extending through the V, from enclosed gearing at the propeller end.

It seems that many little operations in an airplane which are somewhat dependent on the speed of the plane can be performed to best advantage by using a small propeller exposed to the air current created by the motion of the plane, serving as an air motor. Such a device, referred to as the Servo Motor, is being exhibited in two types. In one the power of the Servo Motor is transmitted mechanically by means of shafts and gear, while in the other it is transmitted hydraulically. In this case



Aeromarine eight-cylinder engine



This Curtiss flying-boat has been developed primarily for the use of sportsmen, and is finished exactly after the manner of a high-class motor car

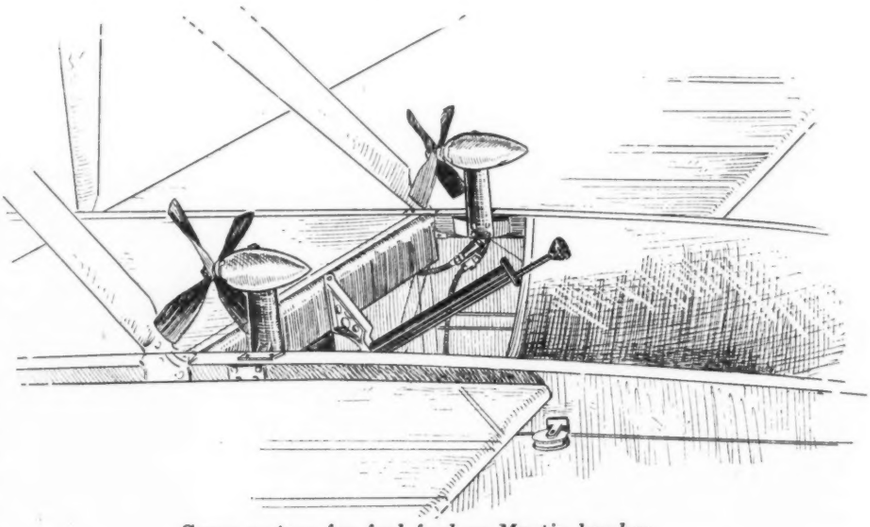
the propeller shaft carries a cam or an eccentric operating a plunger pump pumping oil. The oil may be conducted to any part of the plane and passed through a small hydraulic motor or turbine. The gear case and mounting of the small propeller are made in streamline form to reduce their air resistance to a minimum.

Indicating Instruments Exhibited

Indicating instruments form a most important item in the equipment of an airplane and they are shown in great variety. Instruments form the principal exhibit at the stand of the National Advisory Committee for Aeronautics, and there are also many exhibits by private firms. A recently developed instrument is the Vertimeter exhibited by the Aeronautical Instrument Co. It indicates the rate of climb or descent in feet per minute. It consists essentially of a spun copper tank of streamline form which is connected by means of a rubber tube to a U tube containing a colored liquid. There is a valve near the hose connection to the U tube through which air can escape from the tank to the atmosphere on ascent and pass into the tank on descent. The valve opening is so small that when the plane is either ascending or descending the pressure in the bomb lags behind the change in atmospheric pressure, and the difference between the pressure within and outside the bomb will be the greater the faster the rate of climb or descent. It is this difference in pressure which causes the fluid to rise or fall in one leg of the U tube, the only one which can be seen by the pilot, and the stand of the fluid indicates the rate of climb or descent. The scale has a range from 2000 ft. p.m. rise to 3000 ft. p.m. drop and is provided with a check valve in the top which insures that in case the machine is being put through acrobatic stunts the liquid remains in the tube at the point corresponding to the rate of rise or descent just previous to the moment when the abnormal position of the plane caused the check valve to act.

A further exhibit emphasizing the educational character of the show is that of the American Steel and Wire Co. This comprises a wind tunnel in which are suspended an ordinary ¼-in. stranded cable and a sample piece of the company's streamline airplane cable of equivalent section. Both are pivoted at one point and the air resistance drags the free end around over a graduated sector, the full round cable, of course, much more than the streamline cable. At the moderate air speed maintained in the tunnel the round wire is said to have an air resistance of 12½ per cent and the streamline cable a resistance of only 1½ per cent. It is not stated what the percentage figures are based on, but probably, since the air resistance acts against the weight of the specimen, the latter is the basis of comparison.

It is not necessary here to enumerate the long list of parts makers prominent in the automobile industry who have been drawn into relations with the aircraft industry during the war and are exhibiting their aircraft parts. This list comprises especially makers of ignition equipment, carbureters, ball bearings and forgings. Considerable space is occupied at the show by exhibits of the various branches of the Government doing aircraft work. There are some very fine specimens of aerial photography and map-making.



Servo motors for fuel feed on Martin bomber

Campbell All-in-Mesh Gearset

(*Continued from page* 596)

M in the shaft until they slip under the rings of the desired gear, after which the key automatically and positively rolls into contact with one of the broached openings on the inside of the gear. This action is shown in the cross section view of the gear in Fig. 1. One key takes the load and the other the backlash.

The keys are shown in Fig. 3 and constitute the chief feature of the transmission. In the truck job, the keys are drop-forged from ¾-in. round stock, with 1-in. face. Referring to *A*, Fig. 3, it will be noted that the portion *O* is made 1/16 in. larger than the true radius of the ¾-in. circle. Also the key clears the shaft by 1/32 in., that is, the face of the key must roll in its groove 1/32 in. before it comes in contact with the gear.

The cams on the keys are made with sloping surfaces, which serve a two-fold purpose. One of these is to assist in the engagement of the gear and the other to release it.

The gears cannot take the full load until the key has been first rolled up into place in the gear. Therefore, instead of a shearing strain across the cam as shown at *B*, Fig. 3, the key is under compression, as shown by the dotted line in *C*, Fig. 3.

It is stated that the gears cannot become noisy, as the pitch line is not disturbed. Also the tilting key clutches the gear directly in the center and therefore the gear is not distorted on the shaft, though there may be considerable play between gear and shaft. The layshaft gears are reversible, that is, they can be turned completely around from their present position on the collars to distribute the wear.

In direct drive on high gear the keys are not used, for the clutching gear *E* meshes with *B* as in a conventional gearset. In high gear the following gears revolve: *B*, *E*, *G* and *H*, but *H* is only engaged with *E* for ⅛ in. This is done so that in shifting from high to third the gears are aligned and the key is so timed by the cam lever plate that it will not engage *H* until *E* is fully meshed with it. In going from third to second the key engaged in *H* releases first and then clutching gear *E* engages the double gear *F* for first and second speeds. Here again the key is timed so the gears are fully meshed before the load is taken. Thus there is no chance of stripping

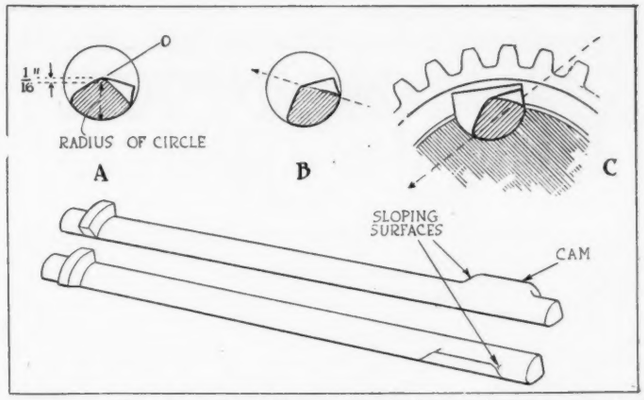


Fig. 3—Keys by which the transmission action is secured

the teeth in any of the gears, even with clutch in. The key shifting yoke at the extreme forward end of the layshaft has just enough play in it so the key slips into position under the selected gear, even though the driver attempts to make the shift very slow. This action is hastened by the sloping surfaces of the keys.

All gears are 6-8 pitch, with the following ratios: Reverse, 1 to 4.81; first, 1 to 4.00; second, 1 to 2.62; third, 1 to 1.50; fourth, 1 to 1.00.

The cam plate which works in conjunction with the key shifting mechanism makes it possible to use but a single rod between transmission and lever set. The cam plate also acts as a locking means for each speed. Thus, to pull the sliding gear out of high to another speed without operating the pull rod it would become necessary to shear the cam plate itself, which in a 2- to 3-ton job is ⅜ in. thick. With the cam plate layout it is impossible to get two speeds at one time.

Concerning lubrication, it is pointed out that the lubricant will last for a very long time, as the gears do not revolve constantly and therefore will not wear out the oil or grease. Also proper oiling of the gears on the collars is accomplished by the keys themselves, which act as pumps, carrying the oil back and forth in the grooves of the layshaft.

Tractor Problems That Are Awaiting Solution

(*Continued from page* 583)

two. The development of gearsets has not been as aggressively carried on as the development of tractor engines and a few other parts in which well-established companies with long experience have devoted their best efforts to the work.

Keeping dust out of engines is still a troublesome problem. Experiments have shown that improved crankcase breathers are needed. The conventional one will not keep out the dust in certain sections. The development of an air filter is being carried ahead, but this, too, has scarcely reached the parting of the ways, the branching toward water types and centrifugal types. Heretofore size has been too much of a factor. Some are very small but also inefficient. If the efficient filter must be large then let it be made adequately large to do the job.

There is a real lack of a rational tractor seat. The present seat, a hand-me-down from self-binder or mowing machine days, is not suitable. We place a good seat on a motor truck, or any kind of a car and then when it comes to a tractor we put on a seat intended for horse apparatus. Too frequently it is in the center of the machine, whereas it should be closer to the right side so as to afford a good view of the furrow or the other work. Too frequently it is not adjustable; it is not large enough, it cannot take a good cushion. Only one or two makers have as yet recognized that an adjustable seat is needed and that if the operator is to take the best care of the tractor and get the best out of it he should be made as comfortable as possible.

There is need for fenders and a platform for the operator. A tractor operator should not live in a cloud of dust when a standing platform and fenders will prevent it. The fenders are needed for safety. A good tool box should also be provided.

Tractor makers are recognizing that different soil conditions and different crop requirements call for changes in tractor features. The idea that one design will best fill every requirement is being exploded. The blanket tractor, that will do any job in any country in the world, is losing out. Some makers of creeper types have wider creeper belts for the rice country. At the same time that this has been done some wheeled types have been spending large sums vainly endeavoring to demonstrate that the identical size of wheel will do in the rice lands that does in the hard soil. A movement for differentiation has set in. One large maker has a new tractor which he has been selling in the East but not in the West. It is better suited to the hilly areas of the East than some of his older models.

It seems highly probable that different diameters and different widths of wheels may have to be sold with the same tractor, one for a hilly country and the other for a level area; one where the soil is hard when being cultivated and the other where it is soft. If wheel diameters were standardized how easy it would be to give the farmer what was best for him and what was also best for the tractor. Standardization may demand that we go a step further. Wheels may be made with standardized hubs so that one type of wheel can be interchanged with another.

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The Automobile

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Quantity Production Fours

THE evident demand for light-weight, high-quality cars has caused a noticeable tendency toward the increased production of four-cylinder cars. These are not merely brought out by a few scattered, unknown concerns, but some of the best known companies that have been successful in the four-cylinder and other fields are bringing out these cars.

As evidence of this there are the Essex brought out by members of the Hudson company, the new Cleveland brought out by officials of the Chandler company, the new little Overland which will shortly be in big production, and in addition there are reports that other prominent makers will soon be out with four-cylinder designs.

There have been a great many who have predicted the day of the four-cylinder car would come back and that one of the greatest results of the multi-cylinder popularity would be the increased demand for good performance from the four.

Certain it is that it took the multi-cylinder car to show us the creamy smoothness of power, which is so much appreciated by the owner.

Owners who drive their cars around the city for business purposes are demanding more and more a light-weight, high-quality vehicle, which is economical to run and yet which has all of the qualities of acceleration, good appearance and serviceability of the heavier and more expensive types.

Doubtless there are a number of advantages for the long wheelbase, heavy type of car for cross-country work. For the city, however, where the smooth pavements and all-around good traveling conditions exist, it must be admitted that it is folly to utilize the high-powered engine, which not only is wasteful from a fuel standpoint for such use, but which has an absurd ratio of weight to the service rendered. The influx of high quality, small, four-cylinder cars for all-around business use will be welcomed by those who have the true interest of the industry at heart.

Testing Airplanes in Flight

IN no other line of engineering work is the designer so in need of accurate experimental data as in airplane design. It is generally permissible to work with a liberal safety factor, which compensates for any inaccuracy in the calculations or assumptions. For good reasons the safety factor in aircraft must be kept low, and it is therefore of the greatest importance that the calculations for strength of parts, stresses on same in flight, power required for propulsion, etc., be of the highest possible degree of accuracy and based on thoroughly trustworthy data.

So far most of the constants and design factors to be used in airplane design have been determined in the laboratory. The properties of wing sections and of different forms of struts, landing gears and bodies are studied in wind tunnels in which air currents approaching in speed those of a plane in full flight are artificially produced. Power plants and propellers are tested on dynamometer stands, and to simulate as closely as possible the operating conditions in the upper atmospheric regions these tests are now being carried out in a vacuum chamber.

It was felt, however, that there were certain factors which an aircraft designer must know which can be accurately determined only on an airplane in flight. For instance, in a wind tunnel, lift and drift experiments can be made only on reduced scale models and there is then the possibility of committing errors in applying the results to the calculation of the full-sized machine.

Consequently, the Bureau of Standards in collaboration with the National Advisory Council has decided to develop recording apparatus for determining the engine torque, speed of revolution, plane speed, propeller thrust, angle of attack and inclination toward the horizontal. Some of these devices, as, for instance, a recording tachometer for the engine and a recording air speed meter, involve no special difficulties, but we are inclined to consider

the development of some of the others, notably the engine torque recorder and the propeller thrust recorder, problems of very considerable difficulty, on account of the great forces involved and the strict limitations on space and weight on an airplane. Yet we have not the least doubt that all problems will be fully solved and that the use of the apparatus when completed will yield test results that will prove of the utmost value to airplane designers. As all test records will be timed and the timing will be synchronous, it will be possible to study the inter-relations of the different power and resistance factors in flight.

Closed-Cab Advantages

THERE is no such thing as finality—there is always room for improvement and there is always a demand for any refinement which tends to improve the condition of the worker. New York and Chicago truck shows offered a concrete example of these axioms in the case of the enclosed truck cab, a feature of improvement which has been evolved from the plain board seat, the upholstered seat, the open cab, and now the cab which insures protection to the truck driver from the inclemencies of winter weather.

Closed cabs may cost more, but in compensation for their added cost they exercise a two-fold effect. In a material way they tend to increase the working capacity of the driver by reason of the bodily protection afforded, with a corresponding increase in the earning power of the truck to which they are fitted. In an abstract way the closed cab has its effect on the mental make-up of the driver. He starts on a long haul secure in the knowledge that he will arrive at the end of his trip dry and comfortable, his temper remains equable and the physical service he renders is but a reflection of his mental state.

Comfort in Tractor Operation

IT is undoubtedly too early to attempt to standardize tractor controls, but designers individually can strive to arrange their control levers, handles and pedals so that they can be conveniently reached and operated from the seat.

There are some good examples of control layouts, but there are even more examples of poor ones. There is less need for standardized control than on automobiles, as there is no danger of a driver having become accustomed to one form of control meeting with an accident while operating a tractor in which the control devices are differently arranged. Tractor speeds are too low for this.

But the pedals and levers should be within easy reach of the driver, their range of motion should not be excessive, nor should the effort required to operate them such as to cause fatigue to the driver.

Another point that bears directly on the comfort of the driver is the type of seat and the provision for foot rests. The seat should, of course, be spring supported, so that the driver is to a certain extent protected from the shocks incident to ground unevenness. The old style of implement seat is in almost universal use and has the advantage that it is not affected by the weather. Some makers have provided cushioned seats. Owing to the habit of farmers of leaving their machinery in the open in rain or shine it is doubtful whether a permanently cushioned seat is advisable.

It would rather seem that a pressed steel seat so designed as to permit the use of a removable cushion would be preferable. Owing to the somewhat higher speed, and for other reasons, it seems desirable to make the sides and back of the seat somewhat higher than has been customary, so the driver may sit more securely therein.

Foot rests deserve more attention. If the driver must occupy an absolutely fixed position all day long it is very tiring. This is the case if only foot rests of shoe-sole form or stirrup form are provided. There is certainly a great advantage in having regular floorboards, so that the operator can change the position of his legs occasionally or can even stand up if he desired. These floorboards need be neither heavy nor expensive and they are certainly worth their cost.

The same as it pays to look after the health and comfort of industrial employees it will pay to take some of the rough edges off the tractor operator's life. In order to do the most work and the best kind of work the operator must enjoy bodily comforts.

Manufacturing Difficulties

CONCERNS which were fortunate enough to make as war products their own particular line of wares are in a much happier position to-day than those who had to go into lines that varied greatly from what they made in a commercial way.

The disruption of previous sources of supply is one of the chief difficulties. The uncertainty of the materials market is such that at the present practically everyone is waiting for breaks in prices which may or may not occur. The result is that buying is largely a hand-to-mouth proposition and long time material contracts are scarce.

This is not a good condition of affairs either for the manufacturer or the parts maker. The manufacturer is of course very wary of being caught with an unbalanced inventory and he is not going to contract for large supplies of anything as long as he is uncertain that other important parts may be late in arriving. The lesson of the cost of the unbalanced inventory has been too well learned.

It is agonizing to many manufacturers to see good labor slipping away from them when the war contracts are canceled simply because they are not able for various reasons to swing immediately over to peace production. This is particularly true in plants which are somewhat out of the way and where the labor has been gathered together for war work, but is now compelled to leave in search of other employment. These manufacturers know that in a few weeks they will be needing this labor badly and then it may be difficult to secure it.

Latest News of the

Measure to Regulate Aviation

Need for Temporary Measure Recognized—Licenses Under Secretary of Commerce

WASHINGTON, March 10—Although there has been no wholesale attempt to control or regulate future aviation in this country, or to formulate aerial laws as has been done in Great Britain by the Civil Aerial Transport Committee, there is a serious movement on foot looking toward future aerial regulations and development.

Officials in this country do not believe that the time is ripe for the formulation of complete permanent laws governing aviation. They point to the peace conference from which there may be issued an international law for aviation.

However, there is a general recognition of the need for some temporary regulations for flying and for the development of the aviation industry. Disappointment was expressed when the army appropriation bill provided for an air service of 1923 officers and 22,000 enlisted men, an organization which would only keep a maximum of 2000 airplanes in constant service.

The aviation industry in the United States, it is felt, should be encouraged as Great Britain is planning to encourage her aircraft manufacturing, by purchasing and using sufficient machines for the Navy and Army even though they are not immediately necessary and may be operated at a loss.

The Post Office also, it is said, should plan for a much wider immediate development of aerial mail so as to encourage the industry and keep it alive until it is a commercially profitable proposition. During the recent Congressional filibuster the army appropriation bill was "killed," and it is anticipated that the new bill which will be presented to the next Congress will call for a larger organization.

It is also planned to introduce at the next session of Congress a bill governing aerial navigation in the United States and its dependencies between the United States and foreign countries which will provide for the control of flying other than that for the Army, Navy and Marine Corps by the Department of Commerce, authorizing the Department of Commerce to license fliers and to publish and formulate rules and regulations for aerial navigation. The law provides for a report from the Secretary of Commerce to Congress no later than Dec. 10, 1919, of his action under this law and appropriates $25,000.

Original plans by the National Advisory Committee for Aeronautics, which has recognized the need for aerial navigation regulations, calls for a complete, comprehensive draft of law such as that of Civil Aerial Transportation Committee of Great Britain.

Toward this end the committee called a conference of representatives of the Departments of State, Treasury, War, Navy and Commerce. A subcommittee was appointed and an actual draft of aerial laws to be presented to Congress was drawn up. Under the plan it was intended to place all aviation under one head. Due to the fact that it would be difficult to assemble all air activities including those of the military and naval establishments under one civil head and also because the Peace Conference may completely alter present opinions regarding the air traffic, these plans were abandoned and it was decided instead to place the entire control of civil aerial transport under the Department of Commerce, leaving the army and navy independent.

Furthermore, it was decided that only temporary regulations should be devised, and the bill drawn up by the executive committee of the National Advisory Committee, headed by Dr. C. W. Walcott, chairman, and Dr. S. W. Stratton, secretary, therefore authorized the Secretary of Commerce "to make and publish all needful rules and regulations with the provision that he report his actions together with recommendations for further and more detailed legislation to Congress in December."

The proposed law was submitted to Secretaries Newton D. Baker, Josephus Daniels and William C. Redfield and approved by all three. The complete text follows:

"That no person, company or corporation within the jurisdiction of the United States and its dependencies, other than duly accredited officers and enlisted men of the Army, Navy and Marine Corps, shall use or operate any aircraft in aerial navigation from one State or Territory of the United States or the District of Columbia, to any other State or Territory of the United States or the District of Columbia, or from one place in a State or Territory or the District of Columbia to another place in the same State or Territory or the District of Columbia, or between the United States or its dependencies and any foreign country or any international waters, except under and in accordance with a license, revocable for cause, granted by the Secretary of Commerce upon application therefor; and the Secretary of Commerce is hereby authorized to grant such licenses and to make and publish all needful rules and regulations for the licensing and navigation of such aircraft; any violation of such rules or regulations to be punished by a fine not to exceed $500; and the Secretary of Commerce shall submit, by December 10, 1919, a report to Congress, giving in detail the action taken by him hereunder, together with his recommendations for further and more detailed legislation with respect to the navigation of aircraft and the licensing and regulation thereof. For the enforcement of this Act and the rules and regulations made in pursuance thereof, including personal services in the District of Columbia and in the field, the sum of $25,000 is hereby appropriated."

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Gen. Mitchell to Head Air Service

WASHINGTON, March 11—Maj.-Gen. William L. Kenly, Director of Military Aeronautics, was relieved of that post to-day and in his permanent grade of colonel was ordered to report to the Chief of Field Artillery for duty. Brig.-Gen. William Mitchell, who has been in charge of the Flying Service of the American Expeditionary Forces, and who formerly had charge of the Flying Section of the Signal Corps, will be detailed to command the Army Aviation Service.

Ford Starts Plans for New Car

Edsel Ford Not to Resign—Dodge Brothers to Contest the New Venture

DETROIT, March 11—Henry Ford and his son Edsel returned to Detroit to-day, and the automobile manufacturer immediately started work on plans for his new car, which he hopes to sell at $250 or $300. How long he will continue this work is problematical for it is said attorneys representing the minority stockholders of the Ford Motor Co. are preparing to serve an injunction, halting further work and bringing the whole affair into court.

In newspaper interviews to-day Mr. Ford corroborates all statements made by himself or his son in Los Angeles and Kansas City relative to his new enterprise. He added a few more unpublished facts and discussed his proposed car in a more detailed way.

Edsel Ford will not resign as president of the Ford Motor Co. He will remain to protect the Ford interests. The Fords propose a factory organization five times that of the present Ford company, and when in full operation over 200,000 men will be on the new Ford pay-roll. One of the big plants will probably be located in Detroit.

Mr. Ford declares there will be a great and immediate demand for a car such as he proposes to build. It will embody everything necessary for a real family automobile. It will have all improvements and refinements that have been developed in recent motor car manufacture.

"The present Ford engine, Model T, was designed 12 years ago," said Mr. Ford. "Nothing of the old car will be used in the new manufacture. It will have an entirely new engine and new features. It will be just what the public wants. It is impossible for me to give you the exact details of the new car yet. Model T took 2 years and 4 months to perfect, so you see it may possibly take me a year before I have my new plan completely worked out."

Elliott G. Stevenson, of Stevenson, Carpenter, Butzel & Backus, attorneys for Dodge Brothers, declares neither Henry Ford nor his son Edsel will be allowed, without a legal fight, to withdraw from the Ford Motor Co. to manufacture a cheaper automobile for commercial purposes and which would antagonize present Ford interests. He says the Dodge brothers will contest the Ford withdrawal to the limit of the law.

"There would be no attempt to keep either Ford or his son in the firm if they desire to retire, but Henry Ford is under contract to

(*Continued on page* 617)

Automotive Industries

Government and Industries to Co-operate in Stabilizing Trade Conditions

Department of Commerce Industrial Board Will Function as Did Old War Industries Board But Without Definite Control—Reduce Basic Prices

WASHINGTON, March 10—That the Government will take a keen interest and supervisory attitude toward industry and will attempt to regulate prices of basic commodities is evidenced by the results of a meeting held here by the Industrial Board of the Department of Commerce, organization of which was told of in AUTOMOTIVE INDUSTRIES last week.

The board, which includes George N. Peak, formerly of the War Industries Board, and vice-president of Deere & Co., as chairman, comprises Samuel P. Bush, president of the Buck-Eye Steel Casting Co.; Anthony Caminetti, Commissioner of Immigration; Thomas J. Glenn, president of the Atlantic Steel Co.; George R. James, president of the Moore Drygoods Co., Memphis; T. C. Powell, Railroad Administration, and W. M. Ritter, president of the W. M. Ritter Lumber Co.

At the first meeting of the board it was generally agreed that although commercial stocks are depleted, money plentiful, building construction demanded, foreign trade prospects good, and the long period of forced economy relieved, yet the public is buying timidly and purchasing is decreasing in volume. Money is also timid and remains in the banks, construction of public and private works has not commenced, non-employment apparently is spreading and few factories are running full.

The first concrete step to alleviate these conditions will be a conference here Wednesday of a committee of steel and iron men with the board, at which it is planned to reach an agreement on lower prices for iron and steel to relieve the present business stagnation.

The cause for these conditions, it was decided, lies in the abnormal and abortive increased production of special war commodities, with the consequent increase of prices, leaving a highly inflated and irregular market far above what the peace demands will support.

The normal operation of the law of supply and demand, it was said, did not cause this condition, and consequently cannot cure it, and with the realization that some prices must fall there is little purchasing until they do fall, and we have as a result an unstable and dangerous market condition. Some of the uncertainty, it was decided, results from the Governmental accumulation of raw, finished and partly finished material which must be fed very carefully into the market.

The remedy, it was agreed, lies in curing the condition as it was caused. It was caused by the co-operation of the industry with the Government in the war and can be cured by the co-operation of the industry with the Government during these present peace times.

To this end the Industrial Board plans to operate as did the War Industries Board, but without the definite control which that board exercised. The Industrial Board plans a general co-operation with all industries, first, by reducing the basic commodities such as steel, to a stable basis.

The industries affected will be invited into conferences for the purpose of bringing prices of basic commodities to a normal level. It is expected that this will automatically reduce the price of fabricated articles. If it does not so operate in any instance the industry affected will be invited into conference.

It is expected that industry will agree to the policy of the board, which is that the cost of living must be substantially reduced before labor should be asked to accept lower wages. This of course must mean that industry must stand the first shock of readjustment.

In discussing this problem and this plan of fixing prices co-operatively, objections to the plan were noted and debated. It was decided that business resentment of Government interference and control could not be regarded as an argument against the plan inasmuch as the Government co-operated helpfully with industry during the war. What is proposed in this new plan is not Governmental control. The board has no power of control and plans only to provide a forum in which industry can meet and agree on a policy for this at Government instance and with the approval of Government.

The board also expects to solve the problem of redistribution and readjustment of labor by stimulating peace industries through the price-fixing plan.

That many of the industries will have to take a loss on products purchased at war prices if there is a general reduction in selling prices it was agreed is true whether the proposed plan is attempted or not, but at least it is expected that buying will begin again and the continued business will overcome the overhead which would be vastly greater if the present period of stagnation continues.

The activities of the Industrial Board will only be temporary and will endure until the gap between war and peace is closed, when a law of supply and demand will again be allowed to operate normally. The offices of the board will be located in the Council of National Defense Building, Washington.

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TO MAINTAIN 22 FIELDS FOR AIRCRAFT

WASHINGTON, March 13—The War Department has arranged to maintain twelve temporary flying fields, which will be used for storage purposes, four permanent balloon fields and four permanent training fields, and at least two experimental fields.

The first intention to retain only two training fields was abandoned when this number was found insufficient, and in consequence Arlington Field, Houston, Tex.; Post Field, Ft. Sill, Okla.; Kelly Field, San Antonio; Rockwell Field, San Diego, Cal.; have been chosen as the permanent training fields.

The twelve fields to be maintained for storage purposes have not yet been definitely named. The War Department believes it can store its hundreds of elementary and advanced training planes for a period of years without deterioration. Langley Field will be retained as one of the experimental fields; McCook Field will be given up, as the city of Dayton wants this property back. Wilbur Wright Field, which has been suggested as an experimental field, will not be used, because of the possibility of floods.

The Air Service would like to purchase the Dayton-Wright plant and use it for its main experimental depot. The Dayton-Wright equipment includes an excellent experimental field and a number of structures, including buildings as large as 1000 x 300 ft., and is considered by the Air Service as especially suitable for experimental work. If this plant can be purchased the Air Service will move its present repairshop from Indianapolis to Dayton. The Government already has a large financial interest in Dayton-Wright, due to war financing, and the balance of the purchase price would consequently be insignificant. In the event that the purchase of the Dayton-Wright plant cannot be consummated some other site in the Middle West close to the airplane and engine factories will be selected.

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May Sell Army Trucks

WASHINGTON, March 12—In view of the decreased size of the Motor Transport Corps and the entire army, as provided for by proposed legislation, it is now considered possible that a large number of war trucks may be sold. The National Automobile Chamber of Commerce has already informed the War Department that it desires first knowledge of any proposed sales and the opportunity to work out some scheme whereby the manufacturer will be protected. The Motors Vehicle section of the Army has assured the N. A. C. C. that it will co-operate with the industry.

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No Plans to Sell Planes as Junk

WASHINGTON, March 12—The War Department denies knowledge of any plan to sell any airplanes as junk, in refutation of newspaper dispatches published this week to the effect that army airplanes would be sold at ridiculously low prices.

Will Pay Promptly on Contracts

Additional Regulations Promulgated to Speed Liquidation of All War Debts

WASHINGTON, March 11 — Additional regulations for the payment and adjustment of war contracts have been compiled by the Assistant Secretary of War, Benedict Crowell. They include provisions for the payment of all proper items of expense to contractors without awaiting full settlements of contracts provided they can be properly vouchered as items of cost. Provision is also made to expedite payments under termination clauses where contractors waive rights to proceed with further production and accept the notification of the termination of the contract. Where this is done it is not necessary to await final determination of the total amount of the payment due the contractor, but instead, payments can be made as rapidly as determination for raw material, commitments to sub-contractors, etc.

The provision allowing partial payment of 75 per cent of the contracts as determined by the War Department is included, and Claim Boards are authorized to make these payments when it expedites settlements of outstanding contracts.

In every instance where a prime contractor has to negotiate the settlement of a sub-contractor the local Claims Boards are urged to be prompt in determining what basis of settlement it will approve.

An interpretation of a recent circular, No. 111, with regard to compensation for capital tied up in raw material, decided that so far as the contractors have properly made expenditures and incurred obligations in the performance of contracts the War Department should provide for reimbursement of such expenditures with a reasonable remuneration for the use of capital and service of the contractor, making an allowance up to 10 per cent on the cost of the articles in process, and in addition, in the case of cost plus contracts an extra compensation estimated at the rate of 6 per cent per annum of the capital tied up in raw materials should be allowed, or if the capital tied up in raw materials was borrowed the contractor is to be allowed the rate of interest which he pays for it, provided that this is not already carried in other charges by the contractor.

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Sales Control Board for Surplus Supply Settlements

WASHINGTON, March 11—A Superior Board of Sales Control has been organized, comprising the Director of Sales and the Chief Sales Officer of each sales organization under the various bureaus of the War Department. This board will consider all problems affecting the sale of war surplus supplies, and will formulate the policies and principles covering these sales. It will be the highest body in charge of sales under the Director of Sales, and will have under it Local Boards of Sales Control organized in each supply bureau and department which will form the administrative bodies.

These boards will comprise the heads of the particular sales organizations in each supply bureau and such other members as the Chief of the Bureau will select. Special material boards may be organized when necessary to handle the sale of certain specified materials in each department.

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No Army Vehicles Have Been Sold in France

PARIS, Feb. 22—No American Army automobiles have been sold in France, and no decision has been taken regarding disposal of army automobiles now with the Expeditionary Forces, according to a statement made by Gen. M. L. Walker, director of the Motor Transport Corps in France.

This definite statement puts an end to the wild rumors which have been circulating in France for the last few weeks to the effect that the American government had insisted on the French absorbing all the motor vehicles owned by the American forces in France. Assuming, without any foundation whatsoever, that France had to absorb the 80,000 American army trucks, many newspapers have been crying scandal and have endeavored to stir up trade animosity.

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Parsons Enlarges Its Plant

DETROIT, March 11—The Parsons Mfg. Co. has purchased an adjacent building having floor space of 30,000 ft. Another addition is under construction and will be completed shortly.

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Clayden Leaves Wright-Martin—To Open English Office

NEW YORK, March 12—A. Ludlow Clayden has resigned as consulting engineer for the Wright-Martin Aircraft Co., a position he has held since the winter of 1917. He will establish a consulting engineering business in London early this summer, and will specialize on the investigation of European propositions for American manufacturers. He believes that as soon as tariff questions have been settled connections between America and the allied countries of Europe will be much closer than before the war, and plans to spend a large part of his time in this country.

Clayden spent most of 1918 in Europe studying the methods of manufacture of the Hispano-Suiza engine and its applications to allied airplanes. Previously he was engineering editor of AUTOMOTIVE INDUSTRIES for 3 years and chairman of the Standards Committee of the S. A. E. from 1915 to 1916. He plans to sail for England in about 60 days.

Sell Surplus Aircraft Material

Materials Disposal Section Formed—Machinery to Be Sold at Appraised Price

WASHINGTON, March 10—There has been formed a Material Disposal Section of the Bureau of Aircraft Production, organized on a basis similar to that followed by large commercial houses which handle sales through branch offices. This section will be under the direction of 1st Lt. Charles S. Shotwell. Sales will be made under the supervision of a sales manager stationed at Washington.

The Bureau of Aircraft Production will probably have for sale the following classes of material, and as soon as this material has been established as surplus and policy for the sale of same determined, the bureau will issue bulletins covering the material for sale.

Machine tools and fixtures.
Electrical machinery.
Dies, tools, jigs and gauges.
Chemicals, paints and oils.
Metals.
Motor Accessories.
Lumber.
Hardware.
Buildings and Lands.
Fabrics.
Scrap.
Shop equipment.
Office equipment.
Miscellaneous.

Sales negotiations will be handled by salesmen in each of eight district branches, to be located in Boston, Buffalo, Chicago, Dayton, Detroit, New York, Pittsburgh and San Francisco. These salesmen will be authorized to make sales of property wherever located, after the same has been cleared by the Board of Sales Review of the Office of the Director of Sales, so that the prospective buyers will communicate with the branch office in the city located nearest them.

This arrangement, it is expected, will make it possible for manufacturers needing machinery and supplies to purchase conveniently and at fair prices. The salesmen will have full authority to sell at the best offer made, provided that offer is at or above an appraised value arrived at independently, or at market value in the case of raw material.

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Piehl Elected President of Chicago Automobile Association

CHICAGO, March 11—L. A. Piehl, Mitchell dealer, was elected president of the Chicago Automobile Trade Association at its fifteenth annual meeting. Other officers elected were: Secretary, R. C. Cook, Fiat dealer; treasurer, Thomas H. Hay, Chandler dealer. The new directors are: G. R. Dashiell, Dodge dealer; H. P. Branstetter, Kissel, and Charles Gambill, Marmon.

The result of the show held here by the association was $15,000 profits after rebating to the dealers 75 per cent of the cost of their space.

England Lets Down Bars Against Canadian Products

Will Permit Imports of Products Manufactured Entirely Within Domains of British Empire—Action Will Stimulate Canadian Manufacture

NEW YORK, March 13—Although it is reported from Washington that England has modified her restrictions to the extent of allowing imports from British colonies, official confirmation of the report has not been made nor has the Department of Foreign and Domestic Commerce any information on the subject. It is reported from Ottawa, however that the embargo on imports has been lifted insofar as British colonies are concerned.

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Ottawa Confirms Report

DETROIT, March 13—A cable to the Trade Commission in Ottawa confirms and supplements a report published that the British Board of Trade has announced a definite removal of all restrictions of imports into Great Britain which come from within the British Empire. The Canadian mission in London further states that the Trade Board regulations will insist that goods of only British Empire origin shall be exempt from the rigid general restrictions which were imposed in continuation of wartime trade regulations. Canadian manufacturers should comprehend the importance of the fact that foreign goods cannot, therefore, reach England by way of Canada.

Willys-Overland and other big manufacturers declare that Great Britain cannot possibly manufacture enough cars to supply the British demand, and that within the next month or two the embargo against American made cars will be lifted. They are sitting tight waiting for further action on the part of Great Britain.

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Would Encourage Canadian Manufacturers

DETROIT, March 12—The lifting of the embargo by England, which is now accepting imports from her colonies, will have a tendency to promote complete manufacture of American automobiles in Canada. This is the belief of several Detroit manufacturers operating Canadian plants.

Whether this will give Detroit makers a clear pathway into England through the Canadian branches is problematical, but it is certain that few would take advantage of such subterfuge to gain a European market. The ultimate tendency, they declare, will be enlargement of Canadian assembly plants into Canadian manufacturing plants turning out cars complete.

The Canadian Ford company will not be affected. This company will have its hands full caring for Canadian territory, while the Manchester plant will look after British and European business. The Manchester plant is now running 300 cars weekly, but is not making all of its parts as yet.

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No Australian Embargo

NEW YORK, March 13—The report to the effect that Australia had declared an embargo against all commodities not of British origin is not entirely in accordance with facts. Cable dispatches from Melbourne state that some confusion has arisen and that the embargo is intended to cover only dyestuffs.

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Preliminary Tax Interpretations

NEW YORK, March 12—Although no formal written interpretations of the new war revenue bill have been made, the National Automobile Chamber of Commerce has had a number of lengthy conferences with the officials of the Revenue Bureau on all phases of the new act. In consequence, formal written rulings by the bureau are promised for the immediate future.

In the meantime, and in consequence of these conferences, the N. A. C. C. is pointing out to its members that it seems likely that certain sections of the law will be interpreted about as follows:

All exports of automobiles, and tires, inner tubes, parts and accessories will be exempt from the tax, no matter whether the export is made direct by the factory or through any number of intermediaries. This export exemption is therefore broader than under the old law. All that is necessary is for the manufacturer when he makes the sale, to be able to determine that the sale is for export and that in due course the article is eventually exported.

The Commissioner will shortly issue regulations as to how the intent to export shall be shown. Meanwhile bills of lading and other papers involved in the transaction should clearly show that the shipments are intended for export.

Shipments to the Philippine Islands, the Virgin Islands and Porto Rico are considered export shipments, but the Panama Canal Zone, Alaska and Hawaii are considered part of the United States.

Sales of automobiles, tires, inner tubes, parts and accessories to the Federal Government, to a state or political subdivision thereof will continue to be tax free under the new law, and it will not be necessary to first obtain certain written documents from the buyer. The statement of the manufacturer that the car is sold to the exempt party will be sufficient.

Under the new law the taxpayer who sells both at wholesale and retail may estimate the tax on the retail sales on his customary wholesale price, the customary wholesale price being his highest usual wholesale price, or the wholesale price bearing the least discount.

While there is no floor tax under the new law, manufacturers of automobiles, tires, inner tubes, parts and accessories who have on hand such articles made before Feb. 25, 1919, will be subject to the tax when they sell these articles.

Under the new law no self-propelled fire extinguishing apparatus will be considered a taxable vehicle. This is a broadening of the old law under which certain particular types of fire extinguishing apparatus were considered taxable automobiles.

As the new law contains a penal section (1319) making it a misdemeanor to misrepresent to the purchaser the amount passed on and alleged to be the tax, it is extremely unsafe for taxpayers to use the so-called average tax method.

The most troublesome provision of the new law is the tax on tires, inner tubes, parts and accessories. The Revenue Bureau is having considerable difficulty in getting an exact and workable definition of parts and accessories. It will probably rule that substantially complete manufactured articles of commerce which form parts or components of a complete automobile or which are attached to or used with an automobile are taxable parts and accessories, provided they are primarily intended for such use. This would mean that sheet metal, lumber, leather, wire and the like would be considered 'material' and not taxable. Also that incompletely manufactured articles such as forgings for crank shafts, blanks for gears, and the like would not be taxable. Likewise completely manufactured articles such as ordinary bolts, rivets, screw drivers, wrenches and the like would not be taxable because they are not primarily intended for the automobile but have many other uses.

Spark plugs would probably be considered as primarily intended for automobiles and therefore taxable. The ruling on ball bearings is debatable.

Whatever may be the proper definition of parts and accessories another troublesome point is that sales of such parts and accessories as well as tires and inner tubes to automobile manufacturers are exempt from tax. The Revenue Bureau will probably rule that the sale of such articles by their makers to automobile manufacturers who intend to embody them in their product will be tax exempt, but that any excess purchased for the purpose of replacing defective parts or of selling to car users to replace articles worn out in use would be subject to the tax, with the right of the taxpayer to obtain a refund or credit of taxes if it can be demonstrated that the articles were either given in replacement or were embodied in the complete automobiles by the factory. Parts or accessories which are usually charged for pending settlement of the question as to whether they should be free replacement parts are tax free, but of course are treated as a taxable sale if, and when it is found that the returned part is not defective. It is advisable to make shipment of such replacement parts on memorandum.

In other words, the Bureau is inclined to consider that the factory when it makes the cars is operating as an automobile manufacturer, but when it sells repair parts it is not, and therefore the sale for this latter purpose is not exempt from the tax. This is considered highly unsatisfactory and steps are being taken to obtain a more practicable ruling.

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Meachams Organize Gear Corp.

SYRACUSE, March 12—The Meacham Gear Corp. has been organized to take over the New Process Gear Corp., the manufacture of rawhide pinions by the process developed under the Meachams' direction. Officers of the new corporation are: President, T. G. Meacham; vice-president, T. W. Meacham; treasurer, J. F. S. Meacham. It is incorporated for $300,000 and has purchased a 3-story building at 411-415 Canal Street. George W. Wood, who is secretary, will act as superintendent, and H. W. Kiddle as assistant superintendent.

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New Dodge Four-Door Sedan

NEW YORK, March 11—Dodge Brothers dealers are expecting deliveries within the next two weeks of a new four-door sedan which will sell for $100 more than the present two-door model, making the price of the new model $1,876. The chassis will be the same as at present.

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New Device to Measure Gas Consumption

ST. JOSEPH, MICH., March 11—The "Silent Guard," a new device for measuring gasoline consumption and tire mileage, is being manufactured by the Upton Machine Works. The Silent Guard Co. opened offices in the Owen building.

Flint Facing an Era of Prosperity

Community Has No Unemployed—Big Production Plans Under Way—Wages High

FLINT, March 7—The last traces of war are being removed from Flint industries. The automotive plants here are winding up their war contracts, and the last government cars, motor trucks, trailers, etc., are already complete or are now leaving the assembly line. The city has withstood the shock of from-war-to-peace reconstruction well, weathering this trying period without a suspension of business or suffering a serious labor surplus. Few automotive cities have recovered so quickly the normal tenor of industrial activity. Few cities are today facing a brighter business future than Flint.

The armistice in November found Flint working over-time on war work. Buick, Dort and Chevrolet were bending all efforts to the production of war vehicles. Labor was at a premium. Wages were touching high marks theretofore unknown. The cost of living was climbing correspondingly. More men were being employed than ever before. Marvel Carburetor and Champion Ignition were rushing work on carbureters and spark plugs for war machines and aircraft engines. Flint was up to its neck, so to speak, in war activity, and most of its manufacturing plants were hitting the 100 per cent war production basis requested by the Government. Others were rapidly approaching this mark.

Plants Continued Operation

Flint met its reconstruction problem squarely. Its big automobile plants, in the face of canceled or greatly reduced contracts, continued operation. The men stayed on their jobs. One or two departments closed up for a few days, but comparatively few men were out of work. War work was cast aside. Everything depended on the rapidity with which the plants could get back into commercial production. For five days Dort produced no war or peace vehicles, but every man was employed at inventory work. Although conditions merited laying off at least 4000 of the 13,000 Buick employees, President Walter Chrysler kept every man on the job at the regular war-wage basis.

Flint reconstruction and just how the big men of the city met and solved their many serious problems is a story in itself. They not only cared for their laboring men but they launched an assault on the high cost of living which resulted in a cut of 15 per cent in the price of rent, clothing, eatables and other necessaries of life.

To-day, not quite four months from the day the armistice was signed, finds Flint factories back at normal. Buick is making 400 cars a day and is daily increasing the number of men employed and its production. Dort is making 65 cars daily, which is 15 cars more than it ever made before. The W. A. Paterson Co., which practically did nothing during the year of the war, has resumed normal work, giving employment to 150 men, who are turning out 20 machines a week. Flint Varnish Works, Imperial Wheel Co., Champion Ignition Co. and Marvel Carburetor are rushed with work, and their respective sales departments are flooded with new orders.

There is no question but what this city is facing a great future. It is practically a General Motors town, and the General Motors Corp. is planning a great period of expansion during the next two years. The Buick Motor Car Co. can see nothing ahead but prosperity. President Walter Chrysler publicly states that his concern will be making 1000 cars daily in 1921, doubling its present manufacturing facilities and the number of men employed.

New Plants Building

The Buick company has added several new building units. Rumor has it that Chevrolet will soon be housed in a new factory plant, and the Dort Motor Car Co. has purchased a site on the east side of Flint and is preparing to build, it is unofficially said. The Marvel Carburator Co. will be in a new factory building this year, which will permit this company to double production. The Champion Ignition Co. is now using the buildings erected for war work, but is in great need of further expansion. If this company's business continues to increase more buildings must be built, an official of the company said.

Organized labor is getting firmly established in Flint. This has always been a nine-hour town, but many of the factories are now coming down to an eight-hour schedule. The Buick company and most of its subsidiary organizations are now on an eight-hour basis. The Dort company was the first concern to adopt eight hours as a working day. Chevrolet is still running on a nine-hour schedule, however.

Unemployed from Detroit

Employment men declare that the slight labor surplus recently experienced was not due so much to Flint industrial concerns laying off men as it was due to an influx of unemployed from Detroit and other neighboring cities, where the complete suspension of many big plants threw thousands of men out of employment. Scores of these men found work here. Nearly every returned soldier, whether a former employee of a Flint plant or not, was placed at work by the various Flint companies.

Flint's great fear now is a labor shortage. With her largest industries planning huge expansion, the demand for labor is bound to become pronounced in the course of a few months. The city is already facing a serious housing situation. Hundreds of small homes have been built, but hundreds more of them must be erected at once if the city is to keep pace with her growing manufacturing interests.

The Buick company is still paying its men according to the scale in force during war days. Men working on a regular hour rate are enjoying the same rate. Workers whose efforts were compensated on a piece-work basis are of course not making as much as formerly, inasmuch as all war work is practically at an end. Piece workers are now averaging from $5.50 to $8 a day here and in the other factories. There is but little difference in the wage scales of the various plants. The average rate per hour for common labor in Flint is 46½ cents. In 1918, just prior to the entrance of the United States into the war, the average rate was 30 cents.

The future will bring a wage increase, rather than a decrease, employment officials unanimously declare. Flint will be in need of men shortly and there is likely to be a scramble for available labor. The manufacturers must offer an inducement to bring labor to the city, and this fact in itself will keep the present wage scale up, if not actually increasing it materially.

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Trailer Makers to Meet in Detroit

CLEVELAND, March 10—Plans started at Cincinnati and rehearsed here recently to give trailer manufacturers a bigger place on the world's industrial map than they have had will be completed at a meeting of trailer manufacturers in Detroit March 18.

The gathering will be held under the auspices of the Trailer Manufacturers' Association of America, and the prime object will be the announcement of a program that will keep alive the trailer enthusiasm and prospects that the efficiency shown by the trailer in the war engendered.

The trailer manufacturers started an organization two years ago, but interest waned. The body was revived at Cincinnati on Feb. 20, when the association was reorganized and given the name Trailer Manufacturers' Association of America. The Executive Committee met here Feb. 28, considered plans for strengthening the organization, as well as for promoting the manufacturers' interests, and then adjourned after leaving the questions open for a general meeting in Detroit.

W. E. Ferris, secretary-treasurer of the Ohio Trailer Co., Cleveland, is president; J. C. Endebrock, of the Trailmobile Co., Cincinnati, is secretary-treasurer. These men, with W. A. Murfey, of the King Trailer Co., Ann Arbor, first vice-president; R. C. Sykes, Troy Wagon Works Co., Troy, Ohio, second vice-president; W. R. Bonds, of the Detroit Trailer Co., Detroit; W. F. Jolley, of the Miami Trailer Co., Troy, Ohio, and C. H. Martin, of the Martin Rocking Fifth Wheel Co., Springfield, Mass., compose the Executive Committee of the association.

Federal Highway Plan Endorsed

200 Acceptances to Council Received—Demand Federal Control of Roads

WASHINGTON, March 8—More than 220 acceptances have been received by the Highway Industries Association for membership to the new Federal Highway Council which the association is forming, and which will include those men most prominently identified with the industries interested in roads of the Nation. The council, formation of which was announced in a recent issue of AUTOMOTIVE INDUSTRIES, will work as a unit for the mobilization of Federal resources and control for highway construction, and for the crystallization of public opinion for three projects approved at the Chicago Highway Congress last December when resolutions called for—

Highway Congress Resolutions

1. Creation of a Federal highway commission to control highway construction and development.
2. Federal financial aid for State highway construction.
3. All governmental control of highways to be under the Federal highway commission.

The late appropriation of $200,000,000 for highways provided by the new Post Office bill completes in part the demands of section 2. These funds will be devoted largely to aiding the states, which in recent years voted road funds, but because of the increased cost of labor and materials were unable to apply the funds provided which called for a specified number of miles of construction. With the additional money from the Federal Government this difficulty will be overcome.

The creation of a Federal highway commission is well started by the recent introduction of a bill by Senator Townsend, which will probably come up at the next session of Congress and which was introduced at this time to allow for public consideration and discussion.

Government Control of Highways Urged

Government control of highways entirely under the Federal Highway Commission as demanded at the Chicago meeting has not yet been discussed in Washington. This matter, though entirely logical and feasible according to highways authorities, may meet with some difficulty from the reluctancy of Government departments to give up any work already under their supervision. The roads are now under the Department of Agriculture, and it yet remains to be seen if this department will recognize the fact that roads are now so important that they deserve a separate department that can be devoted to highways work only.

That the nation is recognizing the need and value of good roads is apparent in the national and state interest now displayed, and in the co-operation extended by industrial organizations that have no direct interest in the work, but which understand that highways mean a more prosperous and healthy condition generally. For example, more than 600 organizations, including silk manufacturers, paper box makers and automatic sprinkler producers, have endorsed the resolutions approved at the Chicago highways meeting, besides every good roads organization.

All Industries Profit by Good Roads

The association headed by S. M. Williams has been an important factor in securing the recent state and Federal appropriations. It has worked without attempting to conceal the direct relation of its interests with the industries that will profit through good roads. It has openly announced these interests, contrary to the usual custom that many like bodies adopt. But, according to Mr. Williams, the policy is based on the fact that the industries represented should and do know more about road building than any other interests, and though their interest may be more or less personal, the results that will accrue through road development more than justify the stimulating causes. Industries, it was stated, have a legitimate right to appeal to legislatures despite selfish interests, when the results make for the public good.

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Bill for Regulation of Railroads Introduced

WASHINGTON, March 7—A bill was introduced in the Senate Tuesday for the return and regulation of the railroads. The plan was prepared by the National Association of Owners of Railroad Securities, and has had the attention of the Senate Committee on Interstate Commerce. In presenting the bill attention was called to the fact that it represents largely the interests of the millions of people holding the outstanding securities of the railroads. The fundamentals include:

A definite rule for rate-making, producing a fixed reasonable return to the railroads; provision whereby excess earnings over and above the said fixed reasonable percentage return go into a fund to be expended in the public interest; regional commissions established in the six rate-making districts into which the country is divided by the Interstate Commerce Commission; the incorporation of the National Railways Association to assist in the return of the railroads to their owners, providing means therefor to continue, inaugurate and put into effect such plans of unification, joint use of railroad terminals and other facilities as in the judgment of the trustees thereof may be expedient and in the public interest. There are to be 18 trustees of this corporation, 9 to be the present Interstate Commerce Commissioners, and 9 to be representatives of the railroads, from various sections of the country.

February Production Doubles January

Factories Nearing Normal Output—Labor Situation Cleared Up

DETROIT, March 8—Passenger car production in Michigan and Ohio during February was double that of the preceding month. This is shown in the production reports from 37 leading automobile manufacturers. These plants produced 4871 cars daily in the month, as compared with 2833 in January. Nearly every big company is nearing normal production, and the last of March will find them all back at their regular peacetime stride or setting new production records.

The labor situation has practically cleared up. It is estimated that Detroit's labor surplus has dwindled to 20,000 men. Discounting a normal floating labor surplus of 15,000, this leaves approximately 5000 Detroiters, willing to work, who are unemployed.

The materials situation is improving rapidly. Parts makers are getting back into full production and are now able to meet demands. Every company with the exception of Packard is in production. The Packard company has started work on its new passenger cars, and the first of these will leave the assembly line some time in April.

Daily production figures for January and February follow:

Car	Jan.	Feb.
Buick	100	400
Briscoe	30	50
Barley	..	4
Cadillac	55	60
Chalmers	30	65
Chandler	..	50
Chevrolet	..	300
Columbia	8	10
Dodge	300	375
Dort	40	65
Ford	1300	2000
Harroun	4	4
Hudson	30	50
Hupp	38	55
King	..	4
Liberty	15	15
Maxwell	150	150
Monroe	5	5
Oakland	160	160
Olympian	4	5
Oldsmobile	..	110
Overland	320	400
Packard	..	..
Paige	50	50
Paterson	4	10
Jackson	..	..
Reo	100	100
Saxon	10	50
Scripps-Booth	20	40
Studebaker	..	150
Essex	30	50
Grant	25	35
Roamer	..	4
Allen	..	..
Nelson	..	..
Velie	..	45
Total	2833	4871

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1917 Tons of Rubber From Canada to United States

WASHINGTON, March 7—Following the removal of restrictions, 1917 tons of rubber were released for entry from Canada to the United States on Feb. 13, 1919, according to an announcement made by the War Trade Board.

Feb. Rubber Imports Double Jan.

14,079 Tons Set High Water Mark for Same Month in Last Four Years

NEW YORK, March 12—In the past four years the February importation of crude rubber never reached the volume of 14,079 tons brought into the United States last month. Although February is not usually as heavy a buying month as the later spring and summer, this year's record is higher than that for April any preceding year. Last month's figure is 971 tons more than February, 1918, and almost double 7,235 tons for January, 1919.

Figures compiled by the Rubber Association of America for importation records of crude rubber for the past four years follow:

	1916 Tons	1917 Tons	1918 Tons	1919 Tons
January	9,162	12,788	16,084	7,235
February	1,597	10,162	13,108	14,079

Class Automobiles as Unmarketable Staple

WASHINGTON, March 12—The Federal Reserve Board has classified passenger automobiles as "not marketable staples," and as a result many rediscounts on dealers' notes are being refused by Federal Reserve banks. In the case where the dealer is discounting his notes directly with the Federal Reserve banks there appears to be no objection on the part of the Federal Reserve Board. But they refuse to approve or allow rediscounts where the note is passed through other hands, beginning with the note broker.

There is no clue available as to the reason for this classification of passenger cars. Alfred Reeves, general manager of the N. A. C. C., is in Washington and has conferred with the Federal Reserve Board commissioners. Reeves will file complete data on the subject with the board shortly.

Saxon to Occupy New Factory

DETROIT, March 11—The concrete and steel plant built for the Saxon Motor Car Corp. will soon be ready for occupancy. Just as it was near completion, war started and the government, looking for warehouses big enough to house its ordnance supplies, took over the new plant for the duration of hostilities. As the government is now able to divert its war materials for civilian uses the Saxon plant will soon be emptied.

Weekes-Hoffman to Make Gears

SYRACUSE, N. Y., March 4—The Weekes-Hoffman Co. has completed plans to enter the gear manufacturing industry. It will shortly be turning out gears for automobiles and tractors in quantities which will necessitate the employment of 250 men in the plant on Dickerson Street. W. H. Diefendorf has resigned as chief engineer and a director of the New Process Gear Corp to join Weekes-Hoffman Co. as vice-president and general manager. J. M. Weekes is president and A. J. Hoffman secretary and treasurer.

$82,557,557 Contracts for Motor Vehicles Still Uncompleted

Trucks.	Quantity.	Total Quantity.	Unit Price.	Value.	Total Value.
Ambulances:					
G. M. C. Standard	1,492	.....	$1,225.00	$1,827,700.00	.....
Ford	392	.....	550.00	215,600.00	.....
		1,884	.....		$2,043,300.00
"AA" type, 1-ton:					
G. M. C. Standard	4,981	.....	1,225.00	6,101,725.00	.....
White	.....	.....	.....	.....	.....
		4,981	.....		6,101,725.00
"A" type, 1½-2½-ton:					
White Standardized	1,790	1,790	2,480.00	4,439,200.00	4,439,200.00
Unstandardized:					
Light Aviation	14	.....	2,040.00	28,560.00	.....
Garford	703	.....	2,706.00	1,902,318.00	.....
Pierce-Arrow	583	.....	3,355.00	1,955,965.00	.....
Kelly-Springfield (domestic)	170	.....	2,262.50	384 625.00	.....
Denby (domestic)	168	.....	2,193.50	368,508.00	.....
International (domestic)	140	.....	1,986.85	278,159.00	.....
Wilson (domestic)	75	.....	2,262.50	169,687.50	.....
Moreland (domestic)	10	.....	2,748.00	27,480.00	.....
		1,863	.....		5,115,302.50
"B" type, 3-5 ton:					
Standardized "B"	6,573	6,573	4.000.00	26,292,000.00	26,292,000.00
Packard 3-ton	1,274	.....	3,613.00	4,602,962.00	.....
Heavy Aviation	179	.....	3,000.00	537,000 00	.....
Riker	342	.....	4,500.00	1,539,000.00	.....
Pierce-Arrow 5-ton	266	.....	4,755.00	1,264,830.00	.....
Mack	434	.....	4,240.00	1,840 160.00	.....
Peerless (domestic)	188	.....	3,293.75	619,225.00	.....
Kelly-Springfield (domestic)	439	.....	3,300.00	1,448,700.00	.....
Velie (domestic)	9	.....	3,125.00	28,125.00	.....
Gramm-Bernstein (domestic)	....	.....	.....	.....	.....
Federal (domestic)	165	.....	2,880.00	475,200.00	.....
Standard (domestic)	223	.....	3,000.00	569,000.00	.....
Selden (domestic)	....	.....	.....	.....	.....
Republic (domestic)	125	.....	2.775.00	346,875.00	.....
Moreland (domestic)	20	.....	3,440.00	68,800.00	.....
Packard 5-ton (domestic)	5	.....	5,222.00	26,110 00	.....
Hurlburt, 5-ton (domestic)	100	.....	3,597.00	359,700.00	.....
Federal, 5-ton (domestic)	97	.....	3,597.00	348,909.00	.....
		3,866	.....		14,174,596.00
"TT" type:					
Nash	910	.....	.....	.....	.....
Hudson	....	.....	.....	.....	.....
National	1,527	.....	.....	.....	.....
Paige	932	.....	2,600.00	8,759,400.00	.....
		3 369	.....	.....	.....
*F. W. D.	1,237	.....	.....	.....	.....
Mitchell	1,425	.....	.....	.....	.....
Premier	679	.....	.....	.....	.....
Kissel	755	.....	3,100.00	12,697,600.00	.....
		4,096	.....	.....	.....
*F. W. D. winch	317	317	3,775.00	1,196,675.00	.....
					$22,653,675.00
Total trucks	....	28,739	.....	.....	80,819,798.50
Touring cars:					
Cadillac limousine	12	12	3,332.00	39,984.00	39,984.00
Motorcycles:					
Cleveland	50	.....	185.00	9,250.00	.....
Harley-Davidson	1,321	.....	425.00	561,425.00	.....
		4,023	.....		1,697,775.00
Indian	2,652	.....	425.00	1,127,100.00	.....
					$82,557,557.50

WASHINGTON, March 10—Motor vehicles valued at $82,557,557.50 are still under contract to be built for the United States Army, according to figures given out in the hearings before the Committee on Military Affairs for the Army Appropriation Bill, 1920. Eighty million, eight hundred and nineteen thousand, seven hundred and ninety-eight dollars and fifty cents covers the manufacture of 28,739 trucks and 1884 ambulances; $39,984 is set aside for twelve touring cars, and $1,697,775 is included in the contracts for motorcycle requirements.

French Mfrs. Arrange for Purchase and Manufacture in U. S.

NEW YORK, March 10—Emmanuel Pironneau, a French engineer, has opened a New York office at 1779 Broadway and is representing a number of French manufacturing concerns, for whom he will purchase machine tools and supplies, and will also arrange for the manufacture in this country of a number of French car accessories. The manufacturers of the "Solex" Carbureter and Radiator have authorized Mr. Pironneau to arrange for their manufacture in this country.

Sun Carbureter Taken Over by J. B. D. Carbureter

MILWAUKEE, March 11—The Sun Carbueretor Co., organized with a capital stock of $100,000, has taken over and will develop the business established several years ago by the J. B. D. Carbureter Co., Milwaukee. J. B. Drahonovsky, designer of the carbureter which the new company will manufacture, will be general manager. A new plant will be erected with a capacity of 1000 carbureters a day. At present the company owns a small machineshop and experimental plant on the Howell Road. F. J. Ramler, head of the Curtis Rubber Co., Milwaukee, and Emil F. Deuster are interested in it.

Trucks, Chassis, Cars and Motorcycle Orders Canceled by Government

Purveyor.	Article	Quantity ordered.	Quantity canceled.	Balance.
Atterbury Motor Truck Co.	B chasses	750	750	.....
Bethlehem Motors Corporation	B chasses	1,500	1,500	.....
Brockway Motor Co.	B chasses	1,000	1,000	.....
Clyde Cars Co.	B chasses	500	500	.....
Denby Motor Truck Co.	B chasses	1,500	1,500	.....
Denby Motor Truck Co.	Trucks, 1½-ton	500	250	250
Diamond T Motor Co.	B chasses	2,000	2,000	.....
Dodge Bros.	Light delivery	2,000	2,000	.....
Dodge Bros.	Light delivery	2,000	2,000	.....
Dodge Bros.	Light delivery	1,000	1,000	.....
Federal Motor Truck Co.	Trucks, 3-ton	500	250	250
Federal Motor Truck Co.	Trucks, 5-ton	300	150	150
Ford Motor Co.	Light delivery	4,000	4,000	.....
Ford Motor Co.	Light delivery	2,000	1,000	1,000
Ford Motor Co.	Ambulances	2,500	2,500	.....
F. W. D. Auto Co.	F. W. D. chasses	1,000	1,000	.....
F. W. D. Auto Co.	F. W. D. trucks	2,400	.....	2,400
Garford Motor Truck Co.	2-ton chasses	4,000	3,000	1,000
Gramm-Bernstein Motor Truck Co.	B chasses	2,000	2,000	.....
Gramm-Bernstein Motor Truck Co.	3-ton trucks	100	50	50
Hudson Motor Car Co.	F. W. D. chasses	1,000	1,000	.....
Hurlburt Motor Truck Co.	5-ton trucks	200	100	100
Indiana Truck Corporation	B chasses	1,500	1,500	.....
International Motor Co.	Mack trucks	4,675	200	4,475
International Motor Co.	Mack trucks	1,800	1,800	.....
Kelly-Springfield Motor Truck Co.	Trucks, 1½-ton	340	170	170
Kelly-Springfield Motor Truck Co.	Trucks, 3-ton	820	460	460
Kissel Motor Car Co.	F. W. D. chasses	1,500	1,500	.....
Lewis Hall Iron Works.	B chasses	500	500	.....
Locomobile Co.	Trucks	2,000	1,500	500
Maccar Co.	B chasses	500	500	.....
Midland Motor Truck Co.	B chasses	500	500	.....
Militor Corporation	Tractors	1,000	1,000	.....
Mitchell Motors Corporation	F. W. D. chasses	2,000	2,000	.....
Moreland Motor Truck Co.	3-ton trucks	60	.....	60
Moreland Motor Truck Co.	2-ton trucks	40	.....	40
National Motor Car & Vehicle Co.	F. W. D. chasses	1,000	1,000	.....
National Motor Car & Vehicle Co.	Nash trucks	2,000	.....	2,000
Nash Motor Co.	F. W. D. chasses	4,000	4,000	.....
Mitchell Motor Car Co.	F. W. D. trucks	3,023	.....	3,023
Packard Motor Car Co.	3-ton trucks	3,000	1,500	1,500
Packard Motor Car Co.	3-ton chasses	2,250	2,250	.....
Paige-Detroit Motor Car Co.	Nash trucks	2,000	500	1,500
Paige Motor Car Co.	F. W. D. chasses	1,000	1,000	.....
Peerless Motor Car Co.	White trucks	3,000	3 000	.....
Pierce-Arrow Motor Co.	2-ton chasses	1,600	900	700
Pierce-Arrow Motor Car Co.	5-ton trucks	1,200	600	600
Premier Motor Co.	F. W. D. chasses	2,000	2,000	.....
Republic Motor Truck Co.	B. chasses	2,000	2,000	.....
Republic Motor Truck Co.	3-ton trucks	250	125	125
Rowe Motor Manufacturing Co.	B chasses	500	500	.....
Selden Motor Truck Co.	3-ton trucks	100	50	50
Selden Truck Sales Co.	B chasses	2,000	2,000	.....
Service Motor Truck Co.	B chasses	750	750	.....
Signal Motor Truck Co.	B chasses	500	500	.....
Standard Motor Truck Co.	B chasses	750	750	.....
Standard Motor Truck Co.	3-ton trucks	300	150	150
Sterling Motor Truck Co.	B chasses	750	750	.....
United Motors Co.	B chasses	500	500	.....
U. S. Motor Truck Co.	B chasses	1,500	1,500	.....
Velie Motors Corporation	B chasses	2,000	2,000	.....
Vim Motor Truck Co.	B chasses	500	500	.....
White Motor Co.	Trucks	8,000	5,000	3,000
Wilson Co. J. C.	B chasses	500	500	.....
Wilson Co. J. C.	2-ton trucks	200	100	100
Winther Motor Truck Co.	B chasses	500	500	.....
Hudson Motor Car Co.	Nash Quad trucks	2,000	1,500	500
International Harvester Co.	2-ton trucks	800	500	300
Velie Motors Corporation	3-ton trucks	125	100	25
PASSENGER CARS				
Cadillac Motor Car Co.	Limousines	550	550	.....
Cadillac Motor Car Co.	Touring cars	700	700	.....
Cadillac Motor Car Co.	Limousines	300	200	100
Cadillac Motor Car Co.	Touring cars	700	257	443
Dodge Bros.	Touring cars	1,000	1,000	.....
Dodge Bros.	Touring cars	1,600	1,600	.....
Dodge Bros.	Touring cars	300	300	.....
Dodge Bros.	Touring cars	400	400	.....
Dodge Bros.	Roadsters	500	500	.....
Ford Motor Co.	Touring cars	6,000	6,000	.....
Ford Motor Co.	Touring cars	7,000	7,000	.....
MOTORCYCLES				
Harley-Davidson Co.	Motorcycles and side cars	10,000	10,000	.....
Harley-Davidson Co.	Motorcycles and side cars	5,000	1,000	4,000
Hendee Mfg. Co.	Motorcycles and side cars	18,000	18,000	.....
Hendee Mfg. Co.	Motorcycles and side cars	6,000	3,000	3,000

WASHINGTON, March 8—United States army contract cancellations, affecting 76,205 trucks, 18,507 passenger cars and 32,000 motorcyles, are announced as a result of the hearings of the Committee on Military Affairs for the appropriations for 1920. According to the report, 100,683 trucks, 19,060 passenger cars and 39,000 motorcycles were contracted for.

The list of cancellations also includes the following:

Article	Quantity Ordered	Quantity Cancelled
Bodies	56,645	37,440
Differentials	5,000	5,000
Engines	2,500	2,500
Frames	27,250	25,500
Axles	36,524	35 980
Transmissions	27,500	27,500
Tires	15,600	15,000
Tires, solid	7,578	7,578
Trailers and Tanks	10 301	7,451

In addition to this list there were 25,000 each contracted for and totally cancelled of the following: clutches, universal joints, radiators, steering gears, and springs.

Swedish War Tire Prices to $500

Shortage of Tires and Gasoline —75 Per Cent of Cars Unable to Operate

NEW YORK, March 10—Some of the difficulties that Sweden had to put up with before armistice date have been told in America by Capt. John Neren, editor of Motor, a monthly published in Stockholm. Captain Neren says that during the war 34 x 4 and 35 x 6 tires sold as high as $225 and in some cases up to $500 each. Tires were regularly smuggled from Russia through Finland into Sweden. There was never a time during the war when there was a surplus of more than 5000 tires on hand for the entire country.

Required Permit to Operate Car

It was difficult to operate an automobile as it was necessary to first secure permission to use the car. It was then necessary to get permission to purchase gasoline, which sold as high as $2 per gallon. This aroused the opposition of the people and was perhaps the greatest bar to the general use of automobiles. Sweden has to-day between 6000 and 7000 automobiles and approximately 75 per cent of these were idle during the war.

Since the armistice, tires and gasoline have been arriving in Sweden so that motoring conditions are rapidly opening up. In January, over 2000 tires arrived from the United States, and upward of 1,000,000 gallons of gasoline. Motor trucks are at present on steamboats headed for Sweden.

Alcohol Successful Fuel

During the war the development of alcohol as a motor fuel made considerable progress and engines were developed in which either alcohol or gasoline could be used, the compression being doubled by some device when alcohol had to be used. Sweden has taken up the manufacture of alcohol at a production of 125,000 gallons per month. Captain Neren believes that Sweden can manufacture 5,000,000 gallons per year, which would be sufficient for all of the motor cars and motorcycles there. The price during the war was $1.50 per gallon of 4½ litres. (One litre equals .26417 of a United States liquid gallon.)

Automobile manufacture in Sweden is confined to two factories with a total production of 500 cars and a possible capacity of 1000. There are in addition two truck companies that have an annual production of 100.

There has recently been developed in Sweden a new device for feeding gasoline from the tank to the carbureter which can be used on all types of four-cycle engines, and which has already been patented in America. During the war, when alcohol was being largely used for fuel, ether was used for starting purposes.

N. A. C. C. Will Hold Shows in 1920

NEW YORK, March 12—One of the most important matters decided at last week's meeting of the N. A. C. C. was that the chamber should hold the New York and Chicago shows in 1920. The truck making members also voted in favor of truck shows, provided it is possible to hold them at the same time as the passenger car shows.

Dealers in these cities had hoped that they might be permitted to repeat their present year's program and stage the shows with the approval and co-operation of the factories, but no support for this idea was evident at the meeting despite the fact that a big percentage of the chamber's membership had unofficially gone on record in favor of the dealers.

The statement issued regarding the meeting stated that "the question of closer co-operation by and with the (New York and Chicago) dealers' associations was discussed" and "the directors probably will act upon this suggestion at their April meeting." This statement was taken to mean that the N. A. C. C. would consider giving both associations a larger share in the show profits than they have heretofore received.

The Chamber also resolved that the Bolsheviki movement is being aided by an undue amount of newspaper publicity and that the "best interests of general business and the entire nation demand that such articles should be removed from front page prominence where their real news value precludes excluding them entirely from the columns of public print."

Trade reports indicate that the factories are fast coming back into production, carload shipments for February being approximately 19,000, whereas in February, 1918, they were 12,030.

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Post-War European Models Not Due Yet

CHICAGO, March 6—Passenger cars are beginning to be built in Europe for the general market, but real post-war models will not appear for many months, is a message brought back by David Beecroft, directing editor of the Class Journal Co., who has just returned from a tour of the automotive factories of France, England and Italy. Mr. Beecroft, in an address to the midwest section of the Society of Automotive Engineers last night, said that significant developments in the after-the-war designs are commencing to appear.

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To Form Welding Association

NEW YORK, March 12—A meeting has been called for Friday, March 28, at the Engineering Societies' Building, New York, to form the American Welding Society, which will be a merger of the Welding Committee of the Emergency Fleet Corporation and the National Welding Council. It is the purpose of the society to become a disinterested and dependable source of information on welding, not only for the benefit of manufacturers of welding apparatus and supplies, but also to aid those who use welding processes in their production and those who purchase welded goods. A temporary organization already has been formed, and it is the plan of the permanent body, which it is hoped will come into being on March 28, to provide for membership, which will include corporations, individuals who may be employees of such corporations, and trade associations. The body plans as a part of its routine to carry on certain researches and to direct standardization, legislation, the training of welders and the dissemination of publicity on the whole subject of welding.

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Chalkis Mfg. Co. Will Not Bring Out New Car

DETROIT, March 11—The Chalkis Mfg. Co., organized at the outbreak of the war for gun production, will devote its efforts to commercial automotive production, but the exact nature of its product has not been decided upon at this time. The company proposed to bring out a new automobile, but this project has been abandoned.

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Indianapolis Entries to Date

NEW YORK, March 6—Five entries to date have been made for the Indianapolis Speedway race May 31. These include two Sunbeams, entered by L. Coatalen for the Sunbeam company, a Chevrolet, driven by Durant, and a Hudson, driven by W. W. Brown. Christiaens will drive one of the Sunbeams. The pilot of the second has yet to be selected. Ralph Mulford, as already stated, will drive a Frontenac.

This will be the seventh annual international race meet at this track and will include cars under Class E, or non-stock type of 300 cu. in. or less, with maximum weight at 2500 lb. Prize money will total $50,000 and the Prest-O-Lite trophy and the Wheeler-Schebler cup will be included.

Both Sunbeams will have six-cylinder engines, 3.2 x 6.14, giving cu. in. capacity of 298. The four-cylinder Chevrolet entry's cubic capacity will measure 296.8, with cylinder dimensions of 3 13/16 x 6 7/12 in. The Hudson entered will have twenty-four valves and a piston displacement of 288 cu. in. Its bore is 3½ in. and the stroke 5.

—

Another Foreign Driver for Indianapolis

PARIS, March 10 (Special Cable)—Another foreign driver has signified his intention of entering the 500-mile race on the Indianapolis Speedway, May 31. He is Andre Boillot, brother of Georges, and will drive a Peugeot.

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Officials Undecided About Status of Self-Imported Airplane

WASHINGTON, March 7—Customs authorities have encountered the first case of an airplane imported into the United States under its own motive power. An American bought a Canadian plane, and it was flown across the border near Detroit.

The question then arose as to whether itwas dutiable, since airplanes are not mentioned in any tariff acts. Customs officials finally decided that if it remains permanently in the United States it should be taxed as a "manufactured article" at the rate of 20 per cent, but if it flies out of the country again within 6 months it will be regarded as "on a tour" and will not be taxed.

Tractor Demonstration at Macon

MACON, GA., March 13—Governor Dorsey opened the first of the six tractor demonstrations planned for this season by the National Implement and Tractor Manufacturers' Association yesterday afternoon. It is under the auspices of the Dixie National Power Farming Demonstration, with A. E. Hildebrand, general manager. The exhibition was postponed until yesterday because the field was too wet, and was confined to a parade and street demonstrations. The Chamber of Commerce invited tractor makers to view the surrounding country. They were enthusiastic about soil conditions and look forward to power farming in this territory on a great scale.

Several tractor concerns staged individual exhibits to show the special features peculiar to their own make. On Monday night seven Molines paraded through the city lit with electric lights, to demonstrate their night operating possibilities. The Case is operating a thresher on a street corner and is also showing the cutaway revolving model in the Hotel Dinkler. Hart-Parr demonstrated the strength of its steering cables by lifting the tractor's own weight by them. Other models shown here include Holt, Huber, Illinois, Lauson, Parret, Frick, Cleveland, Fordson, Lacrosse, Avery, International, Oliver, Emerson Brantingham, Beeman and Alama. The Western Electric Company's farm lights are shown at various salesrooms. Merchants are also displaying parts of implements, plow shares, etc., in their windows with various other merchandise that helps give the tractor atmosphere. Many people here are seeing tractors for the first time, and their impression is quite evident from the fact that everyone is talking tractors.

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France Proposes New Import Duties

PARIS, March 12 (Special Cable)—The International Congress of Automobile Manufacturers has voted in favor of a 10 per cent import duty on European cars, and the European members of the Congress voted unanimously that a 45 per cent duty be imposed on cars of American manufacture.

The foregoing cable is printed as received from the European representative of AUTOMOTIVE INDUSTRIES, W. F. Bradley, but there is some doubt as to the constitution of the Congress to which reference is made. It is assumed that it is connected with the Lyons Fair, which is now being held, and at which several American car manufacturers are represented through their French agents. It may be remarked that at present the duty on cars and trucks imported from America into France is 70 per cent ad valorem on vehicles weighing less than 2500 kilos, and that importation is allowed only in the infrequent case where a license is granted.

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Kelly-Springfield Tire Re-elects Directors

NEW YORK, March 11—The annual meeting of the stockholders of the Kelly-Springfield Tire Co., held in Jersey City to-day, resulted in the re-election of all the retiring directors.

The board of directors consists of President Van H. Cartmell, Vice-President Stephen Peabody, Secretary F. A. Seaman, Sales Manager O. R. Cook, A. L. Scheuer, J. Oppenheim, A. M. Poole and B. Maas.

SIDE GUIDE AND GRIPPER

AUTOMOTIVE MATERIALS MARKETS

Materials Market Prices

Acids:
Muriatic, lb. ..... .02 -.03
Phosphoric (85%).. .35 -.39
Sulphuric (60%), lb. .008

Aluminum:
Ingot, lb. ..... .31
Sheets (18 gage or more), lb. ..... .42
Antimony, lb. .... .07 -.07⅛

Burlap:
8 oz., yd..... .07½
10½ oz., yd..... .10¾-.11

Copper:
Elec., lb. ..... .14¾
Lake, lb. ..... .16½-.17

Fabric, Tire (17¼ oz.):
Sea Is., combed, sq. yd. 1.50
Egypt, combed, sq. yd. 1.25
Egypt, carded, sq. yd. 1.15
Peelers, combed, sq. yd. 1.10
Peelers, carded, sq. yd. 1.00

Fibre (⅛ in. sheet base), lb. ..... .50

Graphite:
Ceylon, lb. ..... .09 -.22
Madagascar, lb. .. .10 -.15
Mexico, lb. ..... .03¾

Lard:
Prime City, gal..1.90-2.00
Ex. No. 1, gal...1.10

Linseed, gal. 1.45-1.48
Petroleum (crude):
Kansas, bbl. 2.25
Pennsylv'a, bbl...4.00
Manhaden (dark), gal 1.05-1.06
Lead, lb. ..... .05 -.05⅜

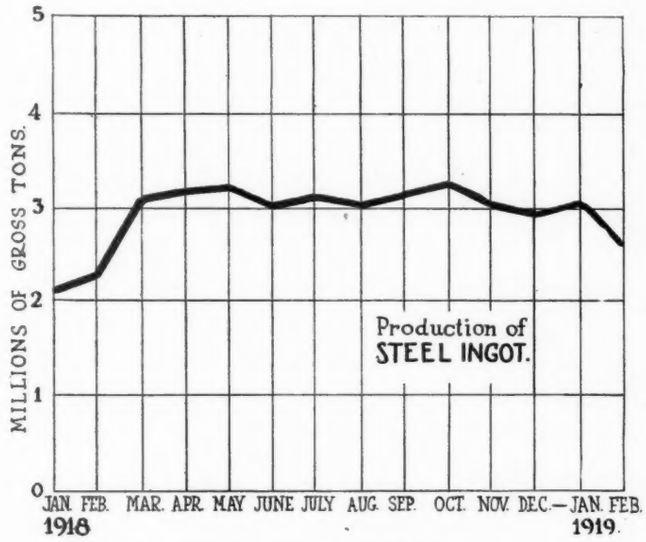
Leather:
Hides, lb. ..... .18 -.34¼
Nickel, lb. ..... .40

Oil:
Gasoline:
Auto, gal. ..... .24½
68 to 70 gal..... .30½

Rubber:
Plantation:
First latex pale crepe, lb. ..... .53½
Brown crepe, thin, clear, lb. ..... .48
Smoked, ribbed sheets, lb. .... .52½

Para:
Up River, fine, lb. .56
Up River, coarse, lb. ..... .34½
Island, fine, lb..... .48
Shellac (orange), lb. .60 -.64
Spelter, lb. ..... .06¾

Steel:
Angle beams and channels, lb. .... .03
Automobile sheet (see sp. table.)
Cold rolled, lb..... .0625
Hot rolled, lb..... .039
Tin ..... .71 -.72
Tungsten, lb. 1.50- 2.10
Waste (cotton), lb... .12¾-.17



From March to October, 1918, production of steel ingots was well maintained. However, figures now seem inclined to fall toward the point at which they were in January, 1918

AUTOMOBILE SHEET PRICES

(Based on No. 22 Gage. Other gages at usual differentials)

	Primes only per 100 lbs.	Primes when seconds up to 15 per cent are taken per 100 lbs.
Automobile body stock	$5.95	$5.85
Automobile body stock, deep stamping.	6.20	6.10
Automobile body stock, extra deep stamping	6.45	6.35
Hood, flat, fender, door and apron, or splash guard stock	6.05	5.95
Crown fender, cowl and radiator casing, extra deep stamping	6.55	6.45
Crown fender, cowl and radiator casing, deep stamping	6.30	6.20

Automobile Sheet Extras for Extreme Widths:
Nos. 17 and 18 over 36 in. to 44 in., 10c. per 100 lb.
Nos. 19 and 21 over 36 in. to 44 in., 30c. per 100 lb.
Nos. 22 to 24 over 26 in. to 40 in., 40c. per 100 lb.
Nos. 22 to 24 over 40 in. to 44 in., 80c. per 100 lb.

Blank Sheet Extras to Apply to Narrow Widths:
Oiling, 10c. per 100 lb.
Patent leveling, 25c. per 100 lb.

Resquaring, 5 per cent of gage price after quality, finish and size extras have been added.

Seconds 10 per cent less than the invoice Pittsburgh price for corresponding primes.

Automotive Securities on the Chicago Exchange at Close March 8

	Bid	Asked	Net Ch'ge
Auto Body Company.....	6¾	..	+¼
Briscoe Motor Car com...	10	..	..
Briscoe Motor Car pfd....	40	60	..
Chandler Motor Car.....124		126	+2
Chevrolet Motor Car.....164		166	..
Cole Motor Car Co.....	90	105	..
Continental Motors com...	7¾	8¼	..
Continental Motors pfd...	97	..	..
Edumunds & Jones com..	15	20	..
Edmunds & Jones pfd....	75	90	..
Electric Storage Bat.....	52	59	—4
Federal Motor Truck.....	32	36	..
Fisher Body Co. com.....	50	53	..
Fisher Body Co. pfd.....	95	98	+3
Ford Motor of Canada....300		310	—15
General Motors com.....156½		157½	+6½
General Motors pfd.....	84⅞	86⅞	+1½
Hupp Motor Car com.....	7¼	8¼	+½
Hupp Motor Car pfd.....	90	..	..
Hupp Motor Car com....	7¼	8¼	+ ½
Kelsey Wheel Co. pfd.....	94½	96½	+½
Manhattan Electric S. com.	..	48	..
Maxwell Motor com.....	35½	36½	+1
Maxwell Motor 1st pfd....	61	62	+2
Maxwell Motor 2nd pfd....	26¼	27¼	+1¼
McCord Mfg. com.....	30	35	—2
McCord Mfg. pfd.....	93	96	..
Mitchell Motor Co.....	27	32	—3

	Bid	Asked	Net Ch'ge
Motor Products Corp.....	..	35	..
Nash Motors Co. com.....	215	230	+40
Nash Motors Co. pfd.....	95	100	+2
National Motor Co.....	15	20	+9
Packard Motor Car com..	114	118	..
Packard Motor Car pfd...	100	102	..
Paige-Detroit Motor com..	28	29	—¼
Paige-Detroit Motor pfd..	8¾	9¾	..
Peerless Motor Truck.....	21	22	+3
Pierce-Arrow M. Car com.	44⅜	45⅜	—⅛
Pierce-Arrow M. Car pfd..	103½	105	—½
Premier Motor Corp. com..	5	..	..
Premier Motor Corp. pfd..	..	75	..
Prudden Wheel Company.	17½	19	+¼
Reo Motor Car Co.....	22½	23½	—¼
*Republic M. Truck com..	35½	37½	..
Republic M. Truck pfd....	87	90	—1
Saxon Motor Car com.....	9⅝	11⅝	—⅜
Scripps-Booth Corp.	21	25	..
*Stewart Warner Spd. Corp.	90½	92½	+1½
Stromberg Carburetor Co..	39	41	—1¼
Studebaker Corp. com.....	60¼	61½	—1
Studebaker Corp. pfd.....	90	94	..
Stutz Motor Car Co.....	49½	50½	+3¾
United Motors Corp.....	41¼	43¼	..
White Motor Co.....	54	55	+ ⅝
*Willys-Overland com. ...	27¼	28¼	+2⅛
Willys-Overland pfd.	91½	93	+1½

RUBBER STOCKS

	Bid	Asked	Net Ch'ge
Ajax Rubber Co.....	74¼	75	—5⅜
Firstone T. & R. com.....140		144	..
Firstone T. & R. pfd.....	99	101	..
Fisk Rubber Co. com.....105		107	+10
Fisk Rubber 1st pfd.....100		105	..
Fisk Rubber 2nd pfd.....101		105	+3
Fisk Rubber 1st pfd. conv.	99	101	..
Goodrich, B. F., com.....	69½	69¾	—½
Goodrich, B. F., pfd.....106		106½	+6
Goodyear T. & R. com....255		260	+12
Goodyear T. & R. 1st pfd..105		107	..
Goodyear T. & R. 2nd pfd.105		107	..
Kelly Springfield com.....122½		123	+11½
Kelly Springfield pfd.....	95	97	+5
Lee Tire & Rubber Co....	25½	26	—1¼
Marathon Tire & Rubber..	55	75	..
Miller Rubber Co. com....166		168	—6
Miller Rubber Co. pfd.....101		102	—1
Rubber Products Co.....122		126	+2
Portage Rubber Co. com..132		164	+2
Swinehart T. & R. Co.....	80	85	..
U. S. Rubber Co. com.....	82½	83	..
*U. S. Rubber Co. pfd.....111½		112½	..

*Ex Dividend.

SIDE GUIDE AND GRIPPER

Van Dervoort in Europe to Study Industrial Conditions

EAST MOLINE, ILL., March 8—W. H. Van Dervoort, president of the Moline Automobile Co., recently sailed for Europe as a member of the commission ordered by the National Industrial Conference Board to visit England, France, Belgium and Italy, to study industrial conditions. It is expected he will be gone some months.

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Stanley D. Livingston, who was in charge of the apparatus design and drafting section of the Signal Corps Radio Laboratory, Camp Albert Vail, N. J., until his release from the army, has been appointed designing engineer for the Connecticut Telephone & Electric Co., Meriden. He was, for a time, connected with the New York Edison Co., and was also assistant chief engineer of the Disco Co., Detroit, which position he resigned to become engineer in charge of the electrical installation at Camp Merritt, N. J.

—

C. F. Hepburn has been appointed director of sales for the Torbensen Axle Co., Cleveland. For the past year and a half he was a major in the Ordnance Department.

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J. H. Malone, advertising director of the Automobile Trade Journal, Philadelphia, for nine years, has resigned to accept a position as vice-president and general manager of the Hudson Motor Specialties Co., Philadelphia.

—

Loyal E. Thompson has been appointed assistant manager of the service department of the Republic Motor Truck Co., Inc., Alma, Mich. He was formerly connected with the service department of the Cadillac Motor Car Co.

—

R. E. Clingan, for the past eleven years representative of the Hess Bright Mfg. Co., has been appointed sales manager of the Bock Bearing division of the Standard Parts Co., Cleveland. W. P. Culver will continue as sales manager of the Perfection spring plant, B. A. Quayle as sales manager of the Standard welding plant, Dan C. Swander as supervisor of sales, B. R. Winborn, manager of the Perfection heater and jobbing divisions, and James A. Braden, advertising manager.

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T. A. Cressey has been appointed sales manager of the Cole Storage Battery Co., Chicago. For the past three years he was district sales manager of the Philadelphia Storage Battery Co., and for several years previous was sales engineer of the Electric Storage Battery Co.

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J. F. Mackin has joined the Black & Decker Mfg. Co. as its Ohio representative. He was formerly connected with the Independent Pneumatic Tool Co.

Men of the Industry

Changes in Personnel and Position

Changes in Carlisle Tire Force

ANDOVER, MASS., March 11—A new central manager and treasurer have been added to the Carlisle Cord Tire Co. organization. A. G. Langher, former central district manager for the Diamond Rubber Co., and connected with it for the past ten years, has been appointed to the same position with the Carlisle Cord Tire Co., with headquarters at Chicago. L. H. Homer, treasurer of the Smith & Dove Mfg. Co., Andover, and previous to that, connected with Stone & Webster Management Association, Boston, has been made treasurer.

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Capt. Sykes to Represent Dutilh-Smith

NEW YORK, March 8—Capt. George Sykes, R. A. F., A. M. I. E. E., who has been in this country nearly four years, attached to the British War Mission in a commercial capacity, is to be the London manager of the engineering and railroad departments of Dutilh-Smith McMillan Co., when he returns to England in May. His London office is Central Buildings, Totehill Street, Westminster.

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Buckwalter Heads American Bureau of Engineering

CHICAGO, March 11—C. J. Buckwalter, formerly manager of the company, was elected president of the American Bureau of Engineering at its annual meeting.

—

S. R. Swiss has been placed in charge of the advertising department of the Republic Motor Truck Co., Alma, Mich. He was recently associated with the Ivan B. Nordham Co., poster advertising, Pittsburgh. Blaine McGrath, former advertising head, is going into the sales department to cover territory in four southern states.

—

Earl Englander, for 10 years a member of the firm of J. A. Englander Co., custom automobile top maker, is now manager of its Detroit plant.

—

Chester Naramore has resigned as Chief of the Petroleum Division, Bureau of Mines, Department of the Interior, and is now associated with the Union Petroleum Co., Philadelphia.

—

Sidney H. Copper, who was associated with Howard E. Coffin, vice-president of the Hudson Motor Car Co., during the existence of the Aircraft Production Board, and later with the National Automobile Chamber of Commerce, Washington office, has opened a stenographic office in Washington especially for visiting members of the automotive industry.

McMullen Leaves Chevrolet for Own Enterprise

FLINT, March 10—B. J. McMullen, general sales manager of the Chevrolet Motor Car Co., has resigned to enter business for himself in Minneapolis, where he will distribute Republic trucks. C. C. Meade, who was assistant to Mr. McMullen, succeeds him.

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Allan H. MacCaffrey, former publicity manager of the S.K.F. Ball Bearing Co., Hartford, Conn., has become general sales manager of Hollister, White & Co., Inc., investment bankers of Boston.

—

New Nash Distribution Co.

SAGINAW, March 7—R. P. Bishop has resigned as assistant sales manager of the Nash Motors Co. and will distribute Nash cars and trucks under the firm name of the Nash Saginaw Motors Co. L. A. Wilson, who was also identified with the Nash factory, is his partner.

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Templeton Heads Detroit Board of Commerce

DETROIT, March 8—Allan A. Templeton, president of the Detroit Seamless Steel Tubes Co., has been elected president of the Detroit Board of Commerce for 1919 and 1920.

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Detroiter Heads Metal Contractors

KALAMAZOO, March 9—Three Detroit men were elected to office in the Michigan Sheet Metal Contractors Association which closed its annual convention here Friday. A. Berschbach was re-elected president. A. F. Prudsch was named a member of the executive committee. H. E. Doherty was chosen vice-president of the traveling men's auxiliary.

Other officers are: Vice-president, Frank Dailey, Jackson; secretary, F. E. Eberle, Grand Rapids, and treasurer, J. A. Shouldice, Battle Creek. The executive committee is composed of Adam Shapper, Bay City, and Harry Rhodes, Grand Rapids. Other officers of the travelers' auxiliary are: President, Harry Snow, Kalamazoo; secretary, L. H. Pearce, Grand Rapids; treasurer, E. E. Bohler, Grand Rapids.

—

Globe Tire Re-elects President

TRENTON, March 11—Joseph B. Linerd was re-elected president of the Globe Rubber Tire Mfg. Co. for a second term at the annual meeting of the stockholders of the company. Before his connection with the Globe organization he was with the Goodyear Tire & Rubber Co. and was later sales manager of the Ajax Rubber Co.

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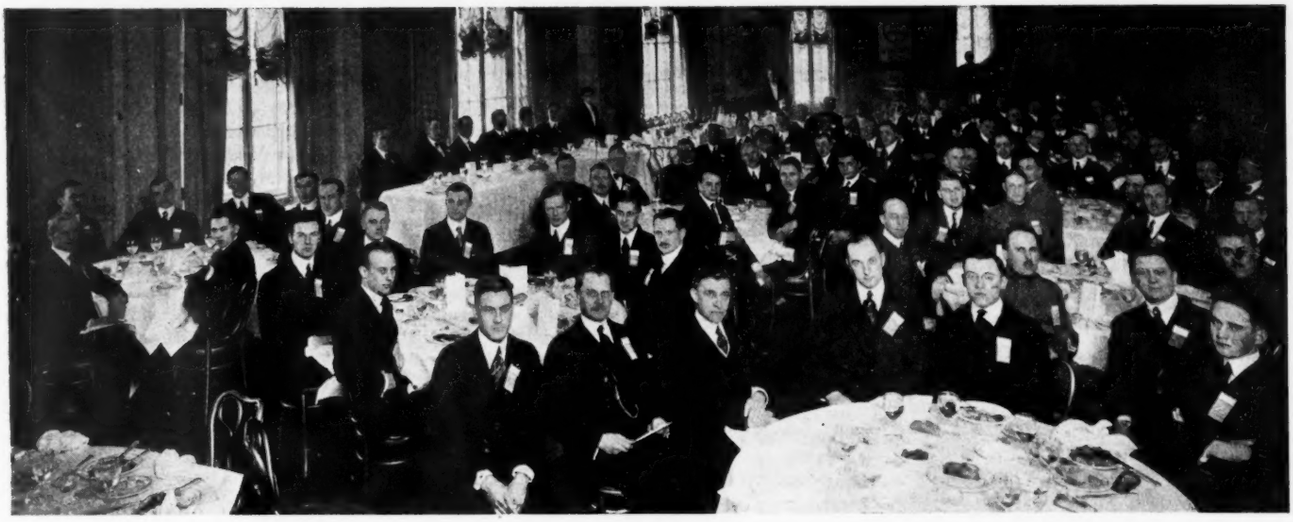
Stewart-Warner Re-elects Officers

CHICAGO, March 8—The retiring officers of the Stewart-Warner Speedometer Co. have been re-elected. C. B. Smith is president, V. R. Bucklin, vice-president; W. J. Zucker, secretary, and T. T. Sullivan, treasurer.



Luncheon given by the Splitdorf Electrical Co. on the occasion of the visit of the Society of Automotive Engineers to the company's main manufacturing plant at Newark, N. J., Friday, March 7

Fisk Rubber to Divide Sales Territories

NEW YORK, March 11—The Fisk Rubber Co. will divide its New York and New England territories into two separate sales districts, known as the New England district, with Walter Oakes as district manager, and Western New York District, with G. T. Newton as district manager.

Mr. Newton has been in charge of Fisk sales in the two territories for the past three years. He will now have supervision over eight direct factory branches, including Buffalo, Syracuse, Rochester, Utica, Binghamton, Elmira, Albany and Erie, Pa. His headquarters will be at Rochester. He has been with the company for four years, first as a special representative of the sales department and the last three years as district manager.

Mr. Oakes has been with the Fisk organization for 12 years. He has been branch manager at Boston for some time, and will combine this work with his duties as district manager.

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C. O. Caniff, assistant to R. W. Langenbacher, sales manager of the Duplex Truck Co., Lansing, has been made superintendent of the eastern sales zone, with headquarters at Atlanta, Ga.

—

William A. Kent, formerly manager of the Kawneer Mfg. Co., Niles, Mich., has resigned to join the S. J. Fitzgibbons Co., manufacturers of tubing and tube products, with headquarters in Detroit.

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A. H. Sarvis has resigned as sales manager of the Flint Varnish & Color Works, Flint, to become associated with the Willys-Overland Co., Toledo.

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F. H. Prescott, formerly designing engineer in the automotive equipment section of the Westinghouse Electric & Manufacturing Co., has joined the staff of the Remy Electric Co. as designing engineer on motor and generator equipment.

Carl J. Spitzley, former retail sales manager of the Studebaker Corp. of America, Detroit branch, has resigned to become associated with the W. D. Block Motor Co., Detroit. W. J. Lannon, in charge of the Studebaker branch at Toledo, has also resigned to join the Block organization.

—

C. A. Riegler, Cleveland, has resigned a connection of twenty-five years with the William Edwards Co. to become director of sales for the Ohio Trailer Co.

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Frank G. Eastman, advertising manager of the Packard Motor Car Co., resigned his position, effective March 1, and has joined the staff of the Lincoln Motor Co., Detroit.

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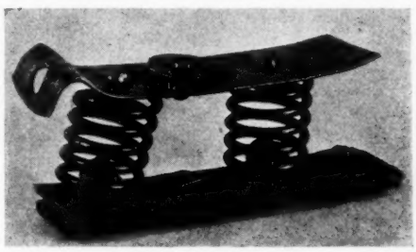
W. H. Holmes, who has been connected with the George H. Dyer Advertising Co., New York City, which handles the Packard, has been appointed advertising manager of the Packard Motor Car Co., Detroit, to succeed Frank G. Eastman, resigned.

—

Lt. Russell Wherrett has resigned from the aviation section of the army and has become manufacturer's representative for the Michigan territory for the Doble-Detroit kerosene burner, which is produced by the Doble-Detroit Steam Motor Co., Detroit.

GERMAN STEEL SPRING TIRE



Contains three plies of spring steel on outer band which is bolted with leather strip—See description on page 483 of Feb. 27 issue of AUTOMOTIVE INDUSTRIES

Weir Heads Canada Foundries

BROCKVILLE, CAN., March 10—At the annual meeting of the Canada Foundries & Forgings Co., Ltd., the following officers were elected: President, W. M. Weir, Montreal; vice-president, J. Gill Gardner, Brockville; secretary and treasurer, J. H. A. Briggs, Brockville. Directors elected were: T. J. Dillon, Welland; G. P. Graham, Brockville; Lieut.-Col. Monsarratt, Ottawa; Lieut.-Col. Smith, Montreal; H. Howser, Toronto; H. Bertram, Dundas, and W. J. Shaughnessy, Montreal.

—

H. H. Pete, for several years in the sales department of the Toledo Scales Co., Toledo, has resigned to take charge of the sales promotion department of the Miller Rubber Co., Akron.

—

Neil MacCoull has returned from duty in France with the Naval Air Forces and is now connected with the Texas Co. as automotive engineer in the sales department, with headquarters in New York. Just prior to enlisting he was acting as a mechanical engineer in the machine works of the Westinghouse Electric & Mfg. Co., Pittsburgh.

—

L. H. Benson has been appointed production manager of the Parker Axle & Products Corp., New York, at its Connecticut plant. Prior to his service with the Government, he was identified with the Minneapolis Steel & Machinery Co. as superintendent and previous to that was with the Triumph Electric Co., Cincinnati.

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Frederick W. Krebs, recently with the Aircraft Production Board, is again affiliated with the United Alloy Steel Corp. and is in charge of its Cleveland sales office, 614 Swetland Building.

—

H. J. Russell has been made chief of the newly created Maxwell-Chalmers export department. He will leave for England in 10 days.

Current News of Factories

Notes of New Plants—Old Ones Enlarged

4000 Columbias in 1919

DETROIT, March 6—The Columbia Motors Co. last week finished its war orders and is now swinging back into peace production. This company built 500 war trucks, 1200 kitchen trailers and completed the larger portion of a $750,000 contract for spare and repair parts. It plans to turn out 4000 passenger cars this year and is at present running ten daily.

Lull Trucks Ready for Quantity Production

WAUSAU, WIS., March 10—The Lull Truck Co., organized about a year ago to take over and develop a quadruple drive design of motor truck, has completed its experimental work and is ready to undertake quantity production. This city will give the company the use of a 30-acre site, including an unfinished manufacturing building, at a nominal rental, with option to purchase within three years from April 1, on condition that the building be completed and equipped, and certain other requirements met by the company. The plant is located on the main line of the Chicago & Northwestern R. R. Karl Mathie of this city is secretary.

Victory Mfg. Co. Will Make Spark Plugs

SPRINGFIELD, MASS., March 10—The Victory Mfg. Co., which has bought the assets of the Gibson & Hollister Co., Springfield, Mass., and Boston, has completed negotiations for the factory building and equipment of the Upson-Martin Co. The new corporation will manufacture spark plugs for tractors and trucks, as well as the Croxford tool and electrical specialties.

Aeromarine on Pre-War Basis

KEYPORT, N. J., March 7—The Aeromarine Plane & Motor Co. has got back into production on a pre-war basis and has reduced its working force. The construction of the 1-story building, 60 x 100 ft., for the New Jersey Motor Sales Co., which builds engines used by the Aeromarine company, has been resumed.

Moline Plow Working for Daily Production of 150

MOLINE, ILL., March 8—The Moline Plow Co. is assembling 50 to 60 tractors per day at present and is working toward a production of 150 per day by the middle of summer. The company is about to install an oven-drying system through which the tractors will be moved on a continuous chain. There is considerable congestion of factory space where air drying is used for the two coats of paint on the final varnish coat. All the engines for the Moline tractors are now being manufactured in the Wilson Foundry & Machinery Co., Pontiac, one of the John Willys plants.

Airplane Experiments

ITHACA, March 7—The Morse-Thomas Aircraft Co. is doing experimental airplane work.

The New 1-Ton Acason

DETROIT, March 6—The new 1-ton Acason truck made its first appearance to the public at the automobile show in the exhibit of the Acason Motor Truck Co. This truck carries a 3¾x5¼ engine. The rear construction is a Timken worm drive, with a three-piece driveshaft. The radiator is of the cast-tank type. It is equipped with a Fuller transmission and multiple disk clutch; Levine steering gear; Eisemann magneto and 36x6 pneumatic cord tires.

Reduction Made in Disco Prices

DETROIT, March 7—The Disco Electric Mfg. Co., Detroit, makers of Disco starting and lighting system for Ford cars, has reduced its price from $100 to $70.

Signal to Make 1000 Trucks

DETROIT, March 8—The Signal Truck Co. is back in commercial production and plans completing 1000 vehicles in 1919.

Republic Finishing Up War Work

ALMA, MICH., March 8—The Republic Motor Truck Co., Inc., is completing an order for 5000 trucks for the Government and is devoting the greater portion of its time to its commercial work. It hopes to be hitting its normal capacity of 3000 trucks monthly soon, but at present its production is considerably below. Shortage of material is seriously affecting production at present, but this situation is rapidly clearing up.

Hall to Build 1000 Trucks

DETROIT, March 10—The Lewis Hall Iron Works is again back on a peace basis after completing 500 machines for the Government. The schedule for the coming year calls for the production of 1000 trucks. This company entered the truck manufacturing field in 1915, producing 100 3½-ton models. The second year it brought out the 2 and 5-ton worm drive model and also the 5 and 7-ton chain drive truck. The first two years most of the trucks were sold along the Atlantic seaboard, but they are now being distributed nationally.

Commerce to Use Pneumatic Tires Exclusively

DETROIT, March 8—The Commerce Motor Car Co. has discarded solid tires as part of the equipment of its 2-ton truck and all new machines of this type will have pneumatic tires. The 1 and 1½-ton trucks will be equipped with either pneumatic or solid tires, according to the wish of the purchaser.

Cameron to Build Tractors

STAMFORD, CONN., March 6—The Cameron Motors Corp., formerly manufacturer of passenger cars, will produce a farm tractor to be known as the Cameron. Specifications of the machine, which it is said have been tested for two years, include a block 4⅜ bore, 6-in. stroke, 4-cylinder engine, with force feed and splash lubrication, kerosene or gasoline carburetor, ignition by generator and storage battery, sectional radiator, etc. The machine has four wheels with two drive wheels at the rear, 42 in. in diameter, 12 in. face. Length is 120 in., width 56 in., height 54 in. and weight 3000 lb. The gearset has three forward speeds and reverse.

Chandler Speeds Up Production

CLEVELAND, March 8—The Chandler Motor Car Co. produced 1200 cars during February, but expects its production to exceed the 2000 mark in March. Reconstruction work seriously interfered with the February output, but now the shift from war to a peace basis is about complete. The Chandler schedule calls for 18,000 cars in 1919. Of this production, the company expects to ship 2000 to foreign countries.

Stinson Tractors Busy on Canadian Orders

MINNEAPOLIS, March 10—The tractor manufacturing plant recently established here by the Stinson Tractor Co. will undertake immediately an order for 300 machines placed during the show here by Martin & Phillips, Medicine Hat, Canada. Delivery is to be made at the rate of 50 per month, commencing April 1. The initial capacity of the Superior works was one machine a day, which is now being more than doubled.

Harrison Radiator Opens Detroit Office

DETROIT, March 11—Sales, inspection and service departments of the Harrison Radiator Corp., Lockport, N. Y., have been opened here at 3066 West Grand Boulevard.

Baker & Lockwood Open New York Branch

NEW YORK CITY, March 10—The Baker & Lockwood Mfg. Co., Kansas City, will open a factory branch here to supply eastern trade.

McGraw Tire Offices Moved to Cleveland

CLEVELAND, March 10—The executive and general offices of the McGraw Tire & Rubber Co. have been transferred here from East Palestine, O., to 1900 Euclid Avenue. A sales and service station has also been opened at 1904 Euclid Avenue. Production plans of the company indicate expansion from 5,000 to 10,000 tires and tubes a day.

Union Truck Pays First Claims

NEW YORK, March 10—The bankrupt Union Truck Mfg. Co. paid a dividend of 2½ per cent March 8.

National Surplus $138,609 Ahead of Year 1917

INDIANAPOLIS, March 11—The balance sheet of the National Motor Car & Vehicle Corp. for the year ended Dec. 31 shows net sales amounting to $2,880,757, and a gross profit on sales of $484,964. The surplus of $1,550,821 for 1918 is $138,609 more than $1,412,212 of 1917.

Comparative financial statements for 1918 and 1917 show:

Assets

	1918	1917
Property and equipment	$849,697	$827,689
Inventories	1,197,094	1,353,750
Accounts receivable	224,884	198,895
Cash	68,186	21,879
Prepaid insurance, expenses, etc.	52,180	67,208
U. S. Government orders (trucks)	208,788	.....
Government claims on		
Government claims on unfinished orders other than truck	88,630	.....
Liberty bonds	2,500	.....
Total	$2,691,961	$2,469,421

Liabilities

Notes and accounts payable	$996,198	$947,034
Deposits by dealers	33,655	44,281
Accrued taxes on car sales	5,257	12,597
Accrued payroll	6,703	7,315
Reserve for taxes	84,325	31,000
Reserve for guarantee on car sales	15,000	15,000
Capital and surplus	1,550,821	1,412,212
Total	$2,691,961	$2,469,421

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Executive Committee Will Help Premier President

INDIANAPOLIS, March 13—A committee of three has been formed to take over the active management of the Premier Motor Corp. This committee is just another name for the manufacturing committee which has been in control of several phases of the company's activities for the last few years, and is composed of the same members: C. S. Crawford, F. T. Nehrbas and E. F. Schaeffer. The manufacturing committee has been changed to the executive committee so that it can take over some of the duties of the company's president, A. C. Flowers, who is unable at this time, because of other financial interests, to devote all his attention to Premier affairs.

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Ford States Plans

(*Continued from page* 604)

the Ford Motor Co. and he will not be allowed to leave the firm and start a competitive business," said Mr. Stevenson.

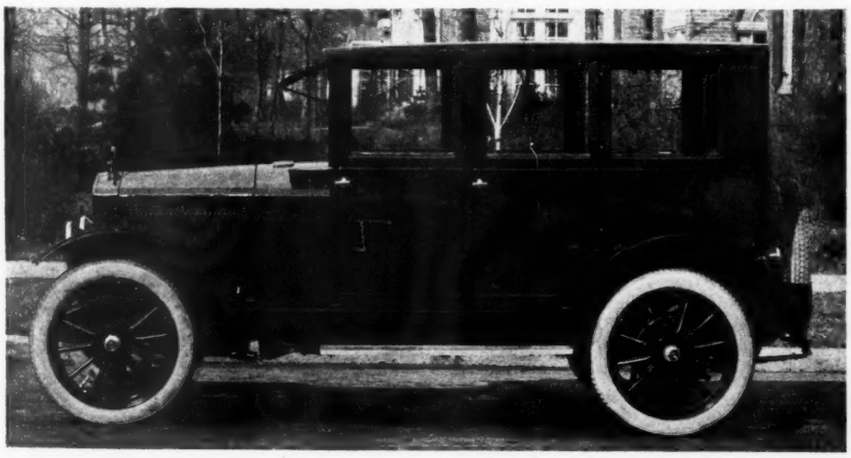
"Both Ford's genius and his name are under contract. The Ford organization will not allow him to withdraw these without legal protest and the courts will certainly uphold the present company. Mr. Ford is also under contract to give all his inventions to the Ford Co. There are men connected with the Ford plant fully as competent as either Mr. Ford or his son to carry on the business, so the protest is not because of the loss of their services, but because of the nature of the new business in which they threaten to engage. They cannot interfere with the success of the Ford Company."

In an interview Edsel Ford is quoted as saying that the Fords would not dispose of their interests in the present Ford company. He said no attempt would be made to force the minority stockholders out of the company. He said the new company would be owned entirely within the Ford family and thus directed without outside interference.

He said the plant would be divided among many cities. All factories will not be built simultaneously. Construction work will start the early part of next year. The first three units will go up in Troy, N. Y., Hamilton, O., and Kansas City. The first factories will be complete, but later each one will be devoted to the manufacture of individual parts. The present Ford system of assembly plants will be followed by the new company.

The Ford plan has created a sensation in business and automotive circles. Automobile manufacturers declare Ford is preparing to tackle his greatest undertaking and there are many who declare that even Henry Ford and his millions are not big enough to swing the deal. They say grave problems face him before he can cut loose from his present company and start production for himself. Costly litigation over patents, contracts, trade-marks, etc., is bound to result and these will consume time as well as cash.

To produce a cheap car such as Ford proposes will require an immense plant capable of great production, for it is pointed out that such a car, to sell at so low a price, must be turned out in great quantities if the venture is to prove a financial success. To build such a plant and reach sufficient production will reuire three or four years car makers believe. They point out that it has taken two years to build up his tractor plant to a point where it will produce 400 tractors daily, and say he must build on a much greater scale if he hopes to get into automobile production with reasonable speed.



THE Essex Co. is exhibiting for the first time at the Detroit show its sedan model. This follows in many respects the square lines of the sedan on the Hudson chassis and is finished in the same dark green as the touring model. The upholstery is in whip-cord. The front seat has a solid back, and the seating capacity is five passengers. The car will sell for $2,250 f.o.b. Detroit

Chandler Net Profits $2,194,618 for 1918

CLEVELAND, March 11—Net profits of the Chandler Motor Car Co. were $2,194,618 for the year ended Dec. 31 last, and adding that to the surplus for Jan. 1, 1918, of $2,663,189, a surplus of $3,381,905 is totalled for the year. Net profits for 1918, however, are $187,785 less than the $2,382,403 earned in 1917. The balance sheet for the past three years compares as follows:

Assets

	1918	1917	1916
Land, buildings, and equipm't	$1,011,192	$650,056	$475,062
Good will	5,000,000	5,000,000	5,000,000
Cash	634,824	698,976	1,800,422
Liberty bonds	1,285,938	279,190	.....
Accounts receivable	147,923	148,192	67,396
Cars sold for export	288,489	192,114	123,287
Due from Government	1,476,238	.....	.....
Inventory	1,874,414	3,018,742	1,876,985
Investment in other companies	36,753	35,090	32,000
Advanced to manufact'rs.	59,428	35,229	72,867
Miscellaneous	89,649	25,004	.....
Deferred payments	25,790	39,011	30,830
Total	$11,930,638	$10,119,604	$9,478,849

Liabilities

Capital stock	$7,000,000	$7,000,000	$7,000,000
Accounts payable	1,043,476	22 349	905,799
Dealer's deposits	86,835	97,860	113,928
Dividends payable	210,000	210,000	210,000
Accrued taxes	81,907	28,334	53,122
Reserves	126,515	97,872	5,214
Surplus	3,381,905	2,663 189	1,190,786
Total	$11,930,638	$10,119,604	$9,478,849

No provision has been made in statement of income, nor in the balance sheet for Federal income, war and excess profits taxes.

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New Cleveland Plant to Cost $650,000

CLEVELAND, March 11—The new plant of the Cleveland Automobile Co., recently organized by Chandler Motor Car Co. officials to produce a $1,300 car, will cover approximately 200,000 sq. ft. of floor space and will cost $650,000. The plant will be completed and the company in operation by July 1. The site of the new factory has not been definitely decided upon.

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Barley Plans Increased Production

KALAMAZOO, March 12—The Barley Motor Car Co. is at present producing at the rate of 6 cars a day, and plans to increase. Recently the company's buildings were completely rearranged with this increase in production in mind.

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Wilson Foundry Adding

PONTIAC, March 11—The C. B. Wilson Foundry & Machine Co. proposes to increase its capacity by the construction of a new building unit 100 x 800. Work is under way and the structure should be completed within 90 days.

Calendar

ENGINEERING

April 2—Minneapolis Section, S. A. E. — Hotel Radisson. "Implements Designed for Tractor Belt Power and Their Characteristics."

SHOWS

March 1-15—New York Aeronautical Exhibition, Manufacturers' Aircraft Assn., Madison Square Garden and 69th Regiment Armory.

March — Scranton, Pa. Thirteenth Regiment Armory, Scranton Automobile Assn.

March—Utica, N. Y. Utica Motor Dealers' Assn. W. W. Garabrandt, Manager.

March—Philadelphia, Pa. Philadelphia Automobile Trade Assn. Passenger cars.

March 8-15 — New Brunswick, N. J. Armory, New Brunswick Motor Trade Assn. William Kuehle, Manager.

March 8-15 — Philadelphia, Pa. Philadelphia Automobile Trade Assn., Commercial Huseum. A. L. Maltby, Manager.

March 10-15—Paterson, N. J. Paterson Automobile Trade Assn., Fifth Regiment Armory. H. MacGinley, Show Manager.

March 10-15 — Salt Lake City, Utah. Sixth Annual, Bonneville Pavilion. W. D. Rishel, Manager.

March 10-15 — St. Louis, Mo. Used Car Show, Exhibit Building. Robert E. Lee, Manager.

March 10-15—Syracuse, N. Y. Syracuse Automobile Dealers' Assn. Harry T. Gardner, Manager.

March 10-15 — Omaha, Neb. Fourteenth Annual, Omaha Automobile Trade Assn., Auditorium. Clark G. Powell, Manager.

March 10-15 — Seattle, Wash. Motor Car Dealers' Assn., State Armory. A. G. Schaeffer, Manager.

March 12-18—Peoria, Ill. Passenger cars, 12 to 15; trucks, 17 and 18.

March 15-22 — Boston, Mass. Boston Automobile Dealers' Assn. Passenger cars only. Chester I. Campbell, Manager.

March 15-22 — Harrisburg, Pa. Harrisburg Motor Dealers' Assn., Overland Warehouse. J. Clyde Myton, Manager.

March 17 - 22 — Great Falls, Mont. Montana Automobile Distributors' Assn.

March 17-22—Philadelphia, Pa. Motor Truck Assn., Commercial Museum.

March 18-22 — Zanesville, O. Third Annual, Zanesville Motor Car Dealers' Assn., City Hall and Market House. Edward B. Roemer, Manager.

March 19-22 — St. Joseph, Mo. St. Joseph Automobile Show Assn., Auditorium. John Albus, Manager.

March 19-22—Norfolk, Neb. Norfolk Automobile Show Assn.

March 19-22—Warren, Pa. Third Annual, Warren Automobile Dealers' Assn.

March 19-22—Charleston, W. Va. Kanawha County Auto Trade Assn., Armory. John B. Crowley, Manager.

March 22-29—Pittsburgh Automobile Dealers' Assn. of Pittsburgh. John J. Bell, Manager.

March 24-29—Greenfield, Mass. Greenfield Automobile Dealers' Assn., State Armory. James J. Callahan (Pittsfield) Manager.

March 24-29—Utica, N. Y. Utica Motor Dealers' Assn.

March 25-29—Wilmington, Del. Fourth Annual, Wilmington Rink.

March 26-27 — Clinton, Ia. Fourth Annual Clinton County Automobile Dealers' Assn.

March 26-29—Watertown, N. Y. Tenth Annual, State Armory, Automobile Dealers, Inc. Arthur E. Sherwood, Manager.

March 27-29—Holdredge, Neb. Third Annual, Holdredge Automobile Dealers' Assn.

March 28-30—Peru, Ill. Illinois Valley Auto Show.

Third week March—Trenton, N. J. Trenton Auto Trade Assn. John L. Brock, Manager.

Last of March — Harlan, Ia. Southwestern Iowa Motor Exhibit.

March 29-April 5 — Passenger Cars. April 8-12—Trucks. Brooklyn. Brooklyn Motor Vehicle Dealers' Assn. I. C. Kirkman, Manager.

March 31-April 5—Cumberland, Md., Automobile Dealers' Assn., Armory.

March 31-Apr. 5—New Orleans, La. Henry B. Marks, Manager.

April 1-5—Denver, Col.—Denver Automobile Trades Assn. Stadium.

April 5-12 — Bridgeton, N. J. Fourth Annual, Automobile Dealers' Assn.

April 5-12—Montreal, Can.—National Motor Show of Eastern Canada, Victoria Rink. T. C. Kirby, Manager.

April 8-12—Deadwood, S. D. Seventh Annual, Cars and Tractors, Deadwood Business Club.

April 16-19 — Waynesburg, Pa. Automobile Dealers' Assn. of Greene Co., Armory. Frank L. Hoover, Mgr.

April—Little Rock, Ark. Second Annual, Little Rock Automobile Dealers' Assn., Liberty Hall.

May 10-17—Bristol, Va.-Tenn. Cars, Trucks, Tractors, Airplanes and accessories. Bristol Chamber of Commerce. C. W. Roberts, Manager.

Not decided—Bridgeport, Conn. Auspices of City Battalion. B. B. Steiber, Manager

Not decided—Indianapolis, Ind. Indianapolis Auto Trade Assn. John B. Orman, Manager.

June 2-6—Hot Springs, Va. Convention, Automotive Equipment Assn., Homestead Hotel.

TRACTOR SHOWS

Mar. 10-15—Macon, Ga. Dixie National Power Farming Demonstration. A. E. Hildebrand, General Manager.

July—Wichita, Kan., Automotive Committee of National Implement Assn

*Oct. 15—Paris. Grand Palais, International Automobile Mfrs. Congress.

November—London — Olympia—International Automobile Mfrs. Congress.

RACES

†March 15—Santa Monica, Cal. Speedway.

†March 23—Los Angeles. Ascot Speedway Assn., Ascot Speedway, 150 miles.

†May 17—Uniontown, Pa., probably 112½ miles.

†May 31—Indianapolis, Indianapolis Motor Speedway Assn., 500 miles.

*July 5—Cincinnati, O., Speedway.

*July 19—Uniontown, Pa. Speedway race.

*July 26—Sheepshead Bay, L. I. Speedway race.

*Aug. 22-23—Elgin, Ill. Speedway.

*Aug. 23—Sheepshead Bay, L. I. Speedway race.

*Sept. 1—Uniontown, Pa. Speedway race.

*Sept. 20—Sheepshead Bay, L. I. Speedway race.

*Oct. 1—Cincinnati, O. Speedway race.

†Sanctioned.
*Tentative dates.

CONVENTIONS

April 10-12—Philadelphia. National Assn. of Motor Truck Sales Mgrs., Bellevue-Stratford.

April 24-26—Chicago — National Foreign Trade Council. Sixth National Foreign Trade Convention. Congress Hotel.

FOREIGN TRADE OPPORTUNITIES

WASHINGTON, March 7—The Bureau of Foreign and Domestic Commerce, Department of Commerce, has inquiries for the agencies of automobiles and accessories. Full information regarding each of the following can be secured by addressing the Bureau of Foreign and Domestic Commerce and referring to the Foreign Trade Opportunity number:

A firm in England desires to buy outright or to act as agent for the sale of cheap but serviceable cars, two to three for the first order, and parts and tools suitable for garage work. Terms, cash or credit, one to three months. Cash for first order. References.

A firm in Ireland desires to secure an agency for the sale of motor cars and motor accessories for the whole of Ireland. References have been filed. Foreign Trade Opportunity No. 28,340.

A commercial agent in France desires to secure an agency for the sale of motor car accessories. Correspondence may be in English. References have been filed. No. 28,342.

A man in France desires to secure agencies for the sale of rubber tires and automobiles. Correspondence should be in English. No. 28,345.

A man in France wishes an agency for the sale of automobile accessories. Correspondence may be in English. References have been filed. No. 28,422.

A man in France wishes to secure an agency for the sale of motorcycles with side-car attachment. References have been filed. Foreign Trade Opportunity No. 28,466.

A firm in Denmark desires the agency for automobiles and motorcycles and all accessories, including tires. Quotation should be made f.o.b. New York. Terms, cash. Letters may be in English.

An engineer in Italy desires an agency for the sale of farm tractors. Correspondence may be in English. Foreign Trade Opportunity No. 28,403.

A man in France wishes to represent American firms in the sale of farm tractors. Correspondence should be in French. No. 28,404.

A man in France wishes to secure an agency for the sale of automobiles and tractors. Correspondence should be in French. No. 28,411.

A commercial agent in Algeria desires an agency for the sale of farm tractors. Correspondence should be in French. References have been filed. No. 28,393.

A firm in Switzerland desires an agency for the sale of farm tractors. Correspondence may be in English. References have been filed. No. 28,399.

A man in France wishes to be placed in communication with exporters of farm tractor with a view to its introduction in that country. Correspondence should be in French. No. 28,488.

A man in Syria desires to secure representation of American firms for the sale of farm tractors in Armenia. Correspondence should be in French. No. 28,491.